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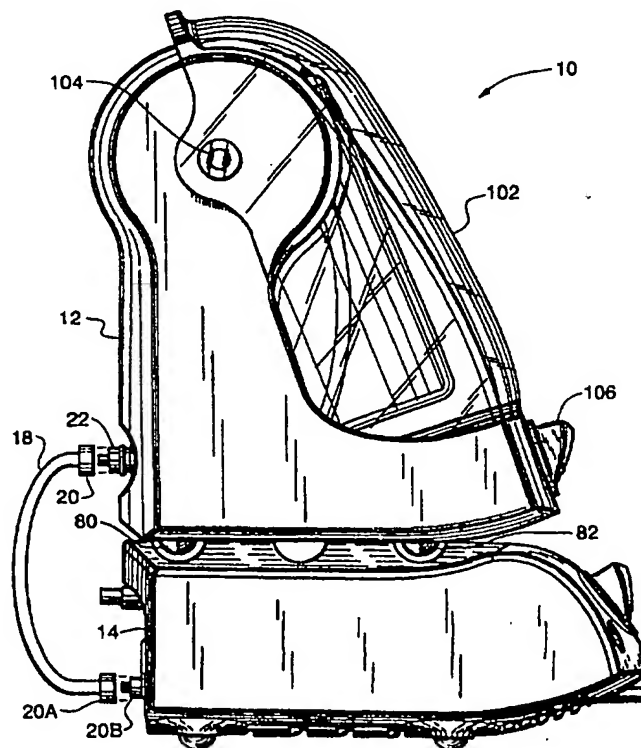


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(21) International Application Number: PCT/US97/17589 (22) International Filing Date: 22 September 1997 (22.09.97) (30) Priority Data: 08/723,199 27 September 1996 (27.09.96) US (71) Applicant: DENTSPLY INTERNATIONAL INC. [US/US]; 570 West College Avenue, P.O. Box 872, York, PA 17405-0872 (US). (72) Inventors: SCHUMAN, Robert, J.; 5 Jasmine Lane, Kings Park, NY 11754 (US). GUILMETTE, V., Richard; 16 Tree- view Circle, Scotch Plains, NJ 07076 (US). SEPTIMUS, Martin, I.; 67-40 Yellowstone Boulevard, Forest Hills, NY 11375 (US). CORBELLINI, Alfred, E.; 312 Wave Place, East Northport, NY 11731 (US). (74) Agents: LOVERCHECK, Dale, R. et al.; Dentsply International Inc., 570 West College Avenue, P.O. Box 872, York, PA 17405-0872 (US).		(81) Designated States: CA, JP, KR, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

(54) Title: STACKING RESERVOIR AND SCALER SYSTEM**(57) Abstract**

An ultrasonic dental tooth treatment system including an ultrasonic dental handpiece, a fluid reservoir housing and a power control housing. The reservoir housing is supported by the control housing. The reservoir housing encloses two containers which are connected to the selector valve. The selector valve is connected to a control housing conduit which is connected to the handpiece. The control housing encloses a power control circuit which is connected to the handpiece. In a preferred embodiment of the invention a fluid dispenser includes at least one readily removable reservoir container supported by a reservoir housing having a pivotable cover and a fluid control valve. The cover is pivotable between an open position and a closed position. The valve is closed by the cover when the cover is in its open position.



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STACKING RESERVOIR AND SCALER SYSTEM

The invention relates to dental scaling systems. The invention provides a stacking dental reservoir and scaling system. The present invention provides a reservoir housing having at least one container which is readily connected to a power control housing and stackable thereon. The level of liquid in each container in the reservoir housing is readily visually inspected through a clear plastic (polymeric) cover. The cover pivots on hinges to swing the lower end of the cover above the reservoir housing to open the housing for removal and/or installation of containers.

It is an object of the invention to provide an ultrasonic dental tooth treatment system including an ultrasonic dental handpiece and attaching cable assembly and control housing and a fluid reservoir housing which encloses two containers, each

connected to a selector valve connected to a control housing conduit connected to a handpiece conduit.

It is an object of the invention to provide a fluid dispenser which includes readily removable reservoir supported by a reservoir housing having a cover which is pivotable between an open position and a closed position and an interlock valve which is closed by the cover when the cover is in its open position.

It is an object of the invention to provide a stacking dental reservoir and scaling system.

It is an object of the invention to provide a dental scaler system having a reservoir housing with a clear plastic cover which pivots on hinges to swing the lower end of the cover above the reservoir housing to open the housing for the removal and/or installation of containers, as is provided by the present invention.

It is an object of the invention to provide a stackable reservoir housing having a self contained

three position selector valve connected in fluid flow communication to a source of air pressure for dispensing from either of two reservoir liquid containers or from a water supply through the selector valve. In a preferred embodiment of the invention only fluid from any one of the containers is conveyed to the handpiece and the system is not connected to an external water supply. By so doing the system can dispense clean water. The system can also be connected to an external water supply, which can also be dispensed to a scaler system.

Warrin et al in U.S. Patent 5,419,703 discloses a method of subgingival scaling and lavage. The apparatus disclosed in Warrin et al includes reservoirs for storing medicament inside a base unit.

The invention solves the problems of the prior art fluid dispensing dental system.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a side view of the right side of a stackable reservoir housing stacked upon a scaler housing in accordance with the invention.

Figure 1A is a side view of the left side of the stackable reservoir housing stacked upon a scaler housing shown in Figure 1.

Figure 1B is a rear view of the stackable reservoir housing stacked upon a scaler housing shown in Figure 1 and 1A.

Figure 1C is a side view of the stackable reservoir housing in accordance with the invention shown in Figures 1-9 with the lid partially cut away.

Figure 2 is a front view of the stackable reservoir housing shown in Figure 1-9.

Figure 3 is a rear view of the stackable reservoir housing shown in Figures 1-9.

Figure 4 is a top view of the stackable reservoir housing shown in Figures 1-9.

Figure 5 is a bottom view of a stackable reservoir housing shown in Figures 1-9.

Figure 6 is a side view of a stackable reservoir housing shown in Figures 1-9 with its lid in open position.

Figure 7 is a top view of a stackable reservoir housing shown in Figures 1-9 with its lid in open position.

Figure 7A is a top view of a stackable reservoir housing shown in Figures 1-9 with its lid in open position with the lid partially cut away.

Figure 8 is a front view of a stackable reservoir housing shown in Figures 1-9 with its lid in open position.

Figure 9 is a rear view of the stackable reservoir housing shown in Figures 1-9 with its lid in open position.

Figure 10 is a top view of the scaler housing in accordance with the invention shown in Figures 10-13.

Figure 11 is a front view of the scaler housing shown in Figures 10-13.

Figure 12 is a side view of the scaler housing shown in Figures 10-13.

Figure 13 is a bottom view of the scaler housing shown in Figures 10-13.

Figure 14 is schematic diagram of the stacking dental reservoir and scaling system shown in Figures 1, 1A and 1B.

Figure 14A, 14B and 14C are schematic diagrams of the air pressure/venting distribution valve (selector valve) in three different positions.

Figure 15 is a top view of a air polishing housing shown in Figures 15-18.

Figure 16 is a front view of the air polishing housing shown in Figures 15-18.

Figure 17 is a side view of the air polishing housing shown in Figures 15-18.

Figure 18 is a bottom view of the air polishing housing shown in Figures 15-18.

Figure 19 is a schematic diagram of the stacking dental reservoir shown in Figures 1C and 2-9 in use with the air polishing system shown in Figures 15-18.

Figure 20 is a schematic diagram of a partial cross-sectional top view of a reservoir housing showing a cap for a container.

BRIEF DESCRIPTION OF THE INVENTION

An ultrasonic dental tooth treatment system including an ultrasonic dental handpiece, a fluid reservoir housing and a power control housing. The reservoir housing is supported by the control housing. The reservoir housing encloses two containers having input passages which are connected to the air pressurization and venting distribution selector valve. The container has output passages which are connected to a control housing conduit which is connected through a solenoid valve and flow control device to the handpiece. The control housing encloses a power generating (and/or control) circuit which is connected to the handpiece. In a

preferred embodiment of the invention a fluid dispenser includes a readily removable reservoir supported by a reservoir housing having a pivotable cover and a cover actuated fluid (pressurized air) interlock fluid control valve. The cover is pivotable between an open position and a closed position. The cover actuated interlock valve is closed by the cover when the cover is in its open position. The cover actuated interlock valve is in open position when the cover is in closed position.

A fluid dispenser includes a readily removable container of the invention supported by a reservoir housing having housing fluid flow connectors (or couplings), a pivotable cover and an air pressure venting distribution fluid selector control valve. The container has a cap with a fluid and an air flow connector (or port). The housing connectors (or couplings) are connected to the cap connectors (or ports). Air pressure is supplied through one coupling to the reservoir and fluid exits from the

same reservoir through another coupling. The seals on the coupling are so placed that upon removal of a reservoir, the seal on the air supply coupling disengages before the seal on the liquid coupling, thereby further venting the air pressure from the reservoir, and preventing leakage during disengagement of the reservoirs. The cover is pivotable between an open position and a closed position. An interlock valve is closed by the cover when the cover is in the open position thereby venting reservoir pressure and at the same time preventing air pressure from entering the reservoirs. The valve is open when the cover is in closed position. The cover in closed position prevents the cap from moving sufficiently for the cap connector to disengage from the housing connector.

The position at the pivots, about which the cover rotates, is located below the contact point between the container caps and the cover. When

either container is pressurized the force of the container cap against the cover thereby causes the cover to be forced into a closed position.

DETAILED DESCRIPTION OF THE INVENTION

The invention is now described with more particular reference to Figures 1-19. It is seen that stacking dental reservoir and scaler system 10 includes a reservoir housing 12 and a scaler housing 14 and a handpiece 16 as shown in Figures 1 and 14. The scaler housing 14 is connected through fluid conveying conduit 18 to coupler 20 which has a shut-off valve. Coupler 20 is inserted in fluid type connection into coupler 22 which has a shut-off valve. Coupler 22 connects fluid conveying conduit 23 to conduit 18. Conduit 18 is connected by couplers 20A and 20B through solenoid valve and flow control device to conduit 24 to convey fluid into ultrasonic handpiece 16.

Coupler with automatic shut-off valve 26 is adapted to be connected to a water supply, which preferably has a pressure of at least 10 psig. Preferably, the water supply has a pressure of at least 20 psig. More preferably the water supply has the pressure of about 60 psig. Water is conveyed from the water supply through the coupler and shut off valve 26 through conduit 28 to air pilot valve 30. Water is conveyed from air pilot valve 30 through conduit 32 into conduit 23, and conduit 18 through a solenoid valve and flow control device into conduit 24 and into handpiece 16. Conduits 34 and 36 have check valves 38 and 40 respectively and are connected to reservoir containers 42 and 44 respectively. Containers 42 and 44 have caps 41 and 43 respectively. Conduit 32 has check valve 87 and is connected to air pilot valve 30.

Reservoir containers 42 and 44 are connected through conduits 46 and 48 respectively to venting distribution selector valve 50. Coupler 52, which

has an automatic shut-off valve, is connected to an air supply of pressurized air, which preferably is regulated to have an air pressure of about 100 psig. Coupler 52 is connected through conduit 54 to pressure regulator 56. Pressure regulator 56 is connected through conduit 58 through interlock valve 60. Valve 60 has a button 62 which must be pressed to open valve 60. When button 62 is pressed, air is conveyed through valve 60 through conduit 64 to selector valve 50. Coupler 66 which has an automatic shut-off valve is connected to conduit 68. Conduit 68 is connected to conduit 54. Coupler 66 provides a connection to pressurized air to operate other devices.

Power control (or generator) 70 is connected to power source 72 through electrical conductor 74 and to power control 70. Power control (or generator) 70 is connected to handpiece 16 through electrical conductor 76.

Feet 80, 80A, 82 and 82A are connected to bottom wall 80B of reservoir housing 12. Feet 80, 80A, 82 and 82A are supported in grooves 84 and 86 in the upper face of scaler housing 14. Feet 80 and 82 are connected to the bottom of the reservoir housing 12.

Reservoir housing 12 has a cover 102 which is opened by pivoting around hinge 104 and 104A. Knob 106 is connected by selector valve stem 106A to valve 50. Turning knob 106 to one side positions the valve 50 to convey fluid from one reservoir through conduit 18. Turn the knob 106 in the other direction from center positions valve 50 to convey fluid from the other reservoir through conduit 18 by pressurization of the respective reservoir chamber. Turning knob 106 to center position vents air from air pilot valve, causing air pilot valve to open and thereby causing external water through conduit 18.

Feet 80 and 80A are supported on groove 160 of scaler housing 14. Feet 82 and 82A are supported in groove 164 in the upper surface of scaler housing 14.

Grooves 160 and 164 prevent feet 80, 80A, 82 and 82A from slipping in forward or reversed directions which are perpendicular to the central axis of the groove. Groove 162 is also provided in the upper surface of scaler housing 14. Grooves 160, 162 and 164 are also adapted for placement of handpiece 16 when reservoir housing 12 is not stacked upon scaler housing 14. Holder 170 is adapted to hold handpiece 16. Holder 170 is connected to scaler housing 14. Knob 158 is connected by valve stem 158A to fluid flow control valve 158B. Knob 156 is connected by electrical conductor 156A to power control 70.

When lid 102 is in closed position, caps 41 and 43 are held by lid 102 onto the adjacent fluid connectors 42A and 44A as shown in Figures 1A and 7A.

Scaler housing 14 is supported by feet 180, 180A, 182 and 182A.

Vents 198, 200, 202, 204 and 206 in the lower wall of scaler housing 14 allow cooling by convection.

Fluid conduit 24 and electrical conductor 76 are enclosed by flexible plastic conduit 76A.

Conduit 20 connected to connector 22 at one end and at the other end to connector 192.

Foot switch 170A is connected by electrical current conductor 170B to power control 70.

As shown in Figures 14, 14A, 14B and 14C valve 50 is rotated to three different positions by turning knob 106. As shown in Figure 14A by turning valve 50 to the position shown air entering valve 50 through line 64 leaves valve 50 through line 56 to pressurize container 42 causing fluid to flow from container 42 through line 34. As shown in Figure 14B by positioning valve 50 in the position shown, air enters valve 50 through line 46 and leave valve 50 through line 48. Air in line 48 pressurizes container 44 causing fluid from container 44 to flow through line 36. As shown in Figure 14C by positioning valve 50 as shown, neither container 42 nor container 44 is pressurized, and fluid does not

flow from either container in this position of valve 50. Rather in the position of valve 50 shown in Figure 14C, air pressure is not supplied to valve 30 and existing air pressure is reduced by a bleed port, opening air pilot valve 30 allowing fluid to flow through line 28 to line 32, as shown in Figure 14.

With more particular reference to Figures 15-19, it is seen that air polishing housing 314 is connected to polishing handpiece 316. Air polishing base housing 314 has grooves 360 and 364 in the upper face thereof. Feet 80 and 82 of reservoir housing are positioned in grooves 360 and 364 of the upper face of the air polishing housing when the reservoir base housing 314 is in stacked position on the air polishing housing. Outer container 390 has container cap 390A. Powder container 390 is connected through a conduit 394 to coupler 66 to provide air pressure in powder container 390. Powder from powder container 390 is conveyed under pressure through conduit 392 to handpiece 316. Fluid is conveyed

through line 18 to air polishing base housing 314. Fluid is conveyed from air polishing 314 through conduit 324 to handpiece 316. Handpiece 316 is provided with a mixing tip 316A which sprays liquid from an outer concentric orifice and sprays powder from an inner-circular orifice. Thus, it provides an annulus of liquid around a circular stream of powder which mixes in the spray prior to polishing the tooth surface. Conduits 392 and 324 are enclosed by flexible plastic cover 376A. Polishing base is supported by feet 380, 382, 380A and 382A. The lower face of air polishing base housing 314 has vent 398, 400, 402, 404 and 406. Handpiece 316 is adapted to be held by holder 370. Knobs 356 and 358 are connected to a variable power control unit, and a fluid flow control valve respectively. Knob 358 is connected by valve stem 358A to fluid flow control valve 358B.

Upon disengaging reservoir cap 41 from housing 12, O-ring 500 unseals relieving any residual air

pressure in container 42, with further outward movement of the cap, O-ring 501 is unseated, and a vent hole is exposed to atmospheric pressure, thereby allowing any fluid remaining in the passageway of the coupler to move back into container 42 avoiding spillage during final withdrawal of cap 41 and container 42 from housing 12 past O-ring 501. Connectors (or couplings) 504 and 505 are connected in fluid flow communication with connectors (or couplings) 506 and 508 respectively. Connector 506 is connected in fluid flow communication with conduit 46. Connector 508 is connected in fluid flow communication with conduit 34.

It will be apparent to those skilled in the art that various modifications and changes may be made in the practice and use of the present invention without departing from the scope thereof as set forth in the following claims.

WHAT IS CLAIMED IS:

1. A fluid dispenser comprising:

a readily removable container supported by a reservoir housing having housing fluid flow connector, a pivotable cover and a fluid control valve; said container having a cap with a fluid flow connector, said housing connector being connected to said cap connector,

said cover being pivotable between an open position and a closed position, said valve being closed by said cover when said cover is in said open position, said valve being open when said cover is in closed position,

said cover in closed position preventing said cap from moving sufficiently for said cap connector to disengage from said housing connector.

2. The dispenser of claim 1 further comprising a venting distribution valve.

3. The dispenser of claim 1 wherein said reservoir housing is supported by feet.
4. The dispenser of claim 1 wherein said dispenser is connected to a source of air pressure at a pressure of at least 35 psi.
5. The dispenser of claim 1 wherein said dispenser comprises at least two readily removable containers.
6. The dispenser of claim 1 further comprising a scaler housing enclosing a scaler conduit, said reservoir housing being stacked on said scaler housing.
7. The dispenser of claim 6 wherein said reservoir housing is connected by a conduit to said scaler conduit.

8. A method of operating a dental tooth treatment system comprising:

providing a dental dispenser having a bottom wall and at least one readily removable container supported by a reservoir housing having a pivotable cover and a fluid control interlock valve,

opening said cover by rotating the bottom end of said cover from a position below said hinges to a position of greater distance from said bottom wall than said hinges,

removing said container from said reservoir housing.

9. The method of claim 8 further comprising filling said container with a medicament containing fluid.

10. The method of claim 9 further comprising connecting said container to said reservoir housing.

11. The method of claim 10 further comprising closing said cover by rotating the bottom end of said cover from a position above said hinges to a position below said hinges.

12. An ultrasonic dental tooth treatment system comprising fluid reservoir housing, a power control housing, and an ultrasonic dental handpiece having a coil,

said reservoir housing being supported by said control housing,

said reservoir housing enclosing a first container and a second container,

said first and second containers being connected in flow fluid communication to a venting distribution selector valve, said selector valve being connected to flow fluid communication with said handpiece,

said control housing enclosing a power control circuit, said power control circuit being connected to said coil in said handpiece,

said reservoir housing having a cover,

said container having a container fluid flow connector,

said reservoir housing having a reservoir fluid flow connector,

said reservoir housing connector being adapted to engage said container connector,

said lid being positioned to prevent movement of said container whereby said container connector is held in said reservoir connector, while said lid is in closed position.

13. A fluid dispenser comprising:

a readily removable container supported by a reservoir housing having housing fluid flow connector, a pivotable cover and a fluid control valve; said container having a cap with a fluid flow

connector, said housing connector being connected to and readily removable from said cap connector,

said cover being pivotable between an open position and a closed position, said valve being closed by said cover when said cover is in said open position, said valve being open when said cover is in closed position.

14. A fluid dispenser comprising:

a readily removable container supported by a reservoir housing having housing fluid flow connector, a pivotable cover and a fluid control valve; said container having a cap with a fluid flow connector, said housing connector being connected to and readily removable from the cap connector,

said cover having a closed position, said cover in said closed position preventing said cap from moving sufficiently for said cap connector to disengage from said housing connector.

15. A dental tooth treatment system comprising a fluid reservoir housing, a base housing, and a dental handpiece having a tip,

said reservoir housing being supported by and positioned above said base housing,

said reservoir housing enclosing a first container and a second container,

said first and second containers being connected to a venting distribution selector valve, said selector valve being connected to said first and said second container, said first and said second container being connected in fluid flow communication with said tip through a conduit in said base housing.

16. The system of claim 15 wherein said control housing encloses a power control circuit, said power control circuit being connected to a coil in said handpiece, and said power control circuit being connected to a footswitch.

17. The system of claim 15 wherein said handpiece further comprises an electrically conducting coil.

18. The system of claim 15 wherein said base housing supports a powder container.

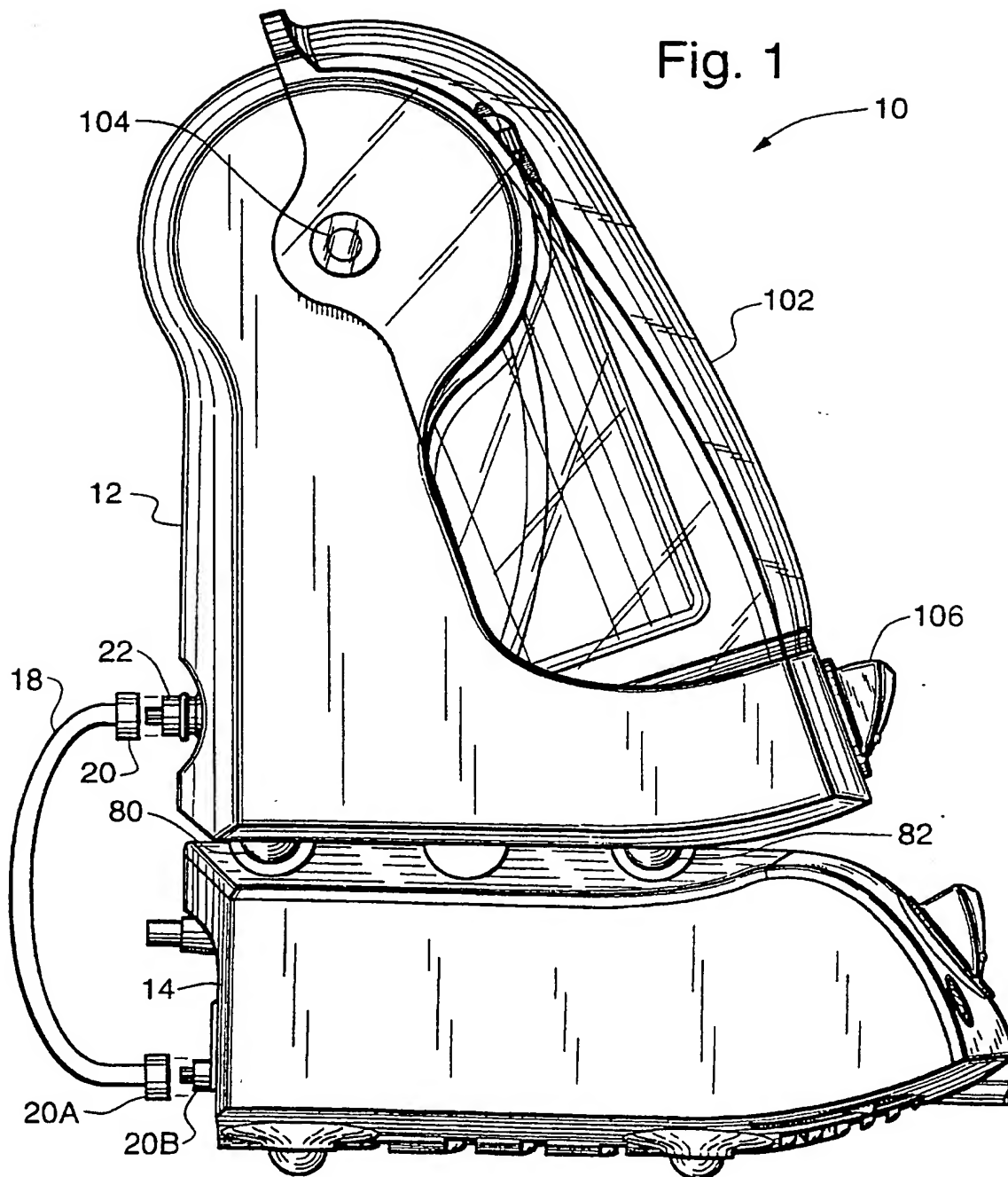
19. The fluid dispenser of claim 1 wherein at least one said connector further comprises a seal.

20. The system of claim 19 wherein said seal is an O-ring.

21. The dispenser of claim 2 wherein said venting distribution valve is a venting distribution selector valve.

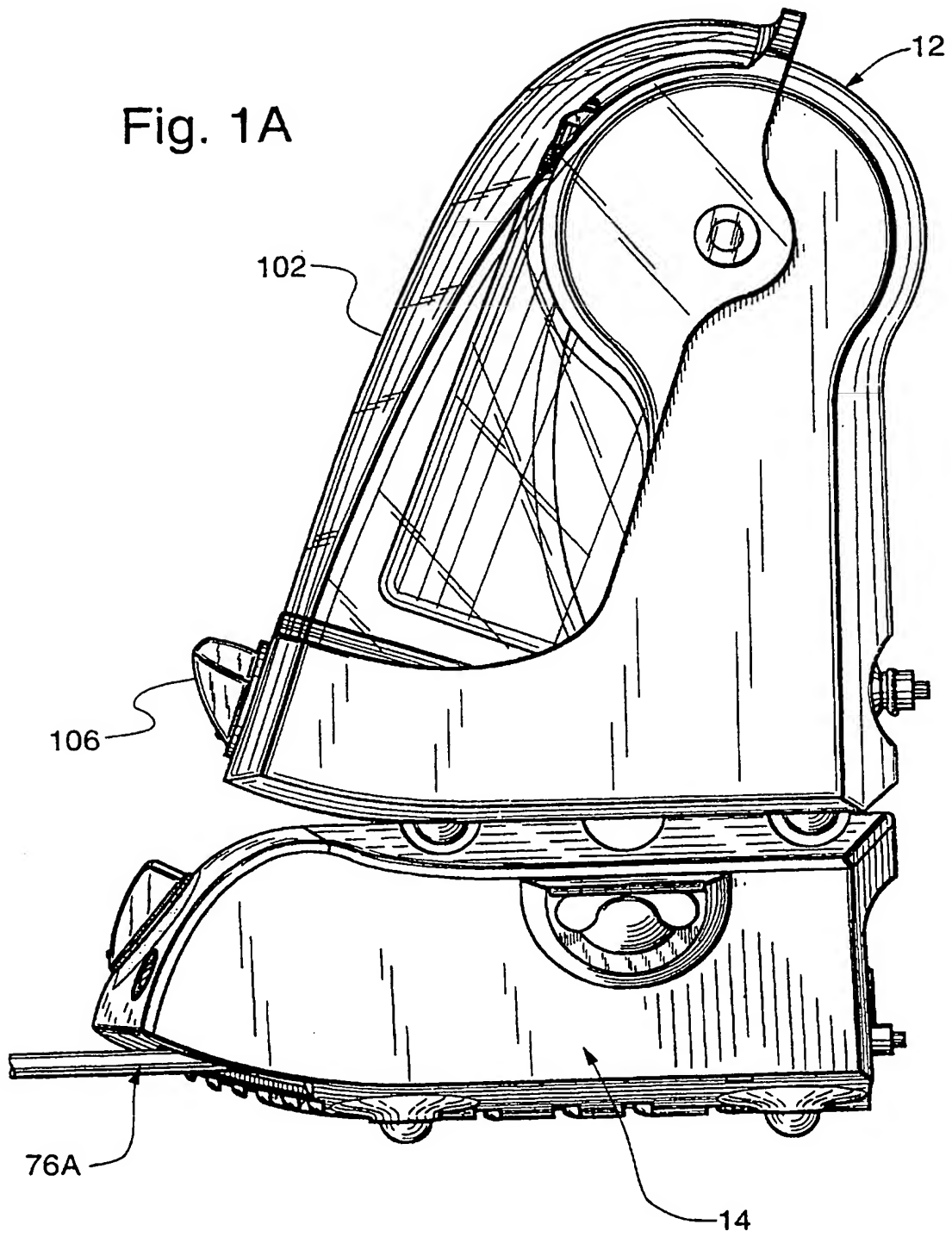
22. The ultrasonic tooth treatment system of claim 12 wherein said handpiece has at least two coils.

1 / 27

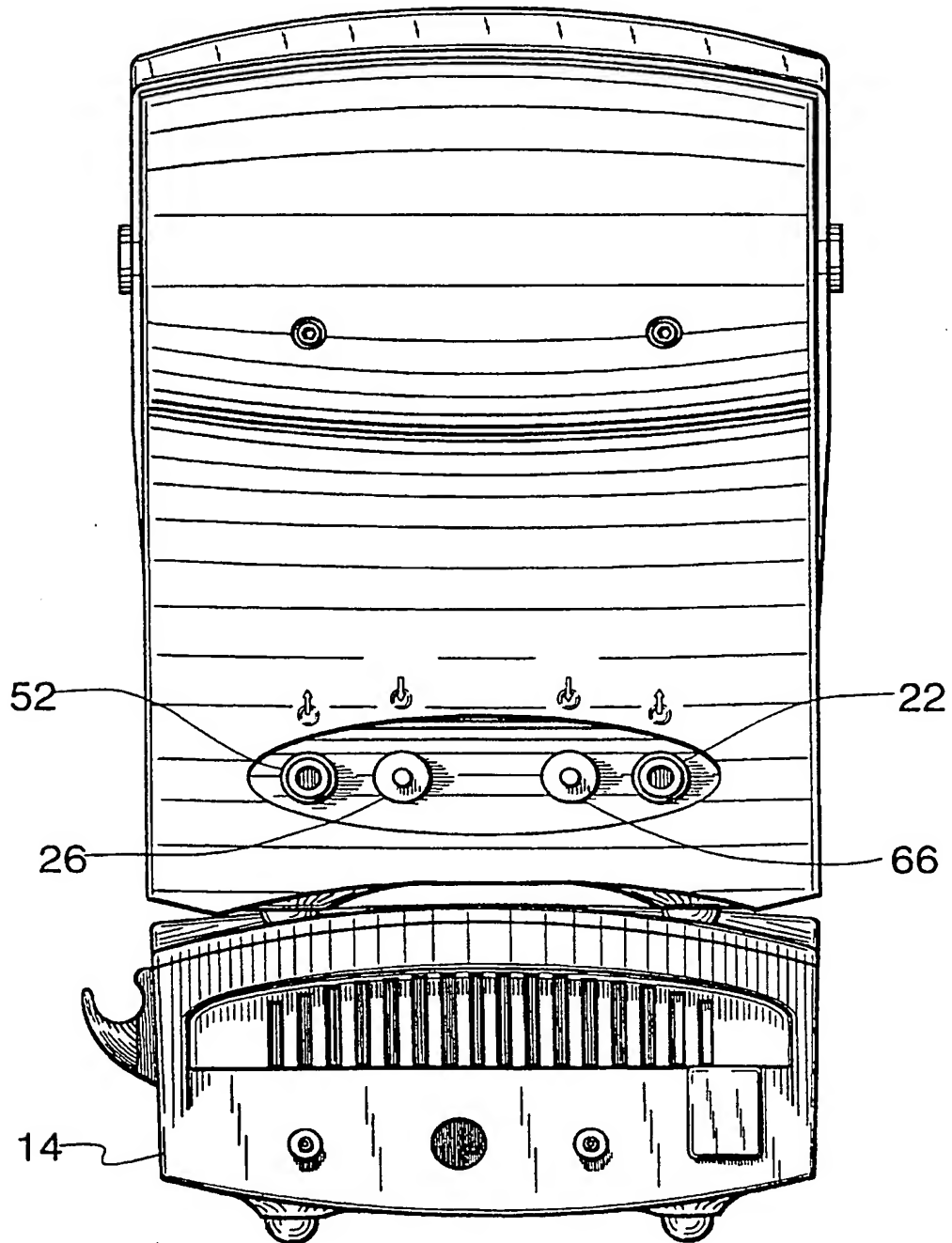


2 / 27

Fig. 1A

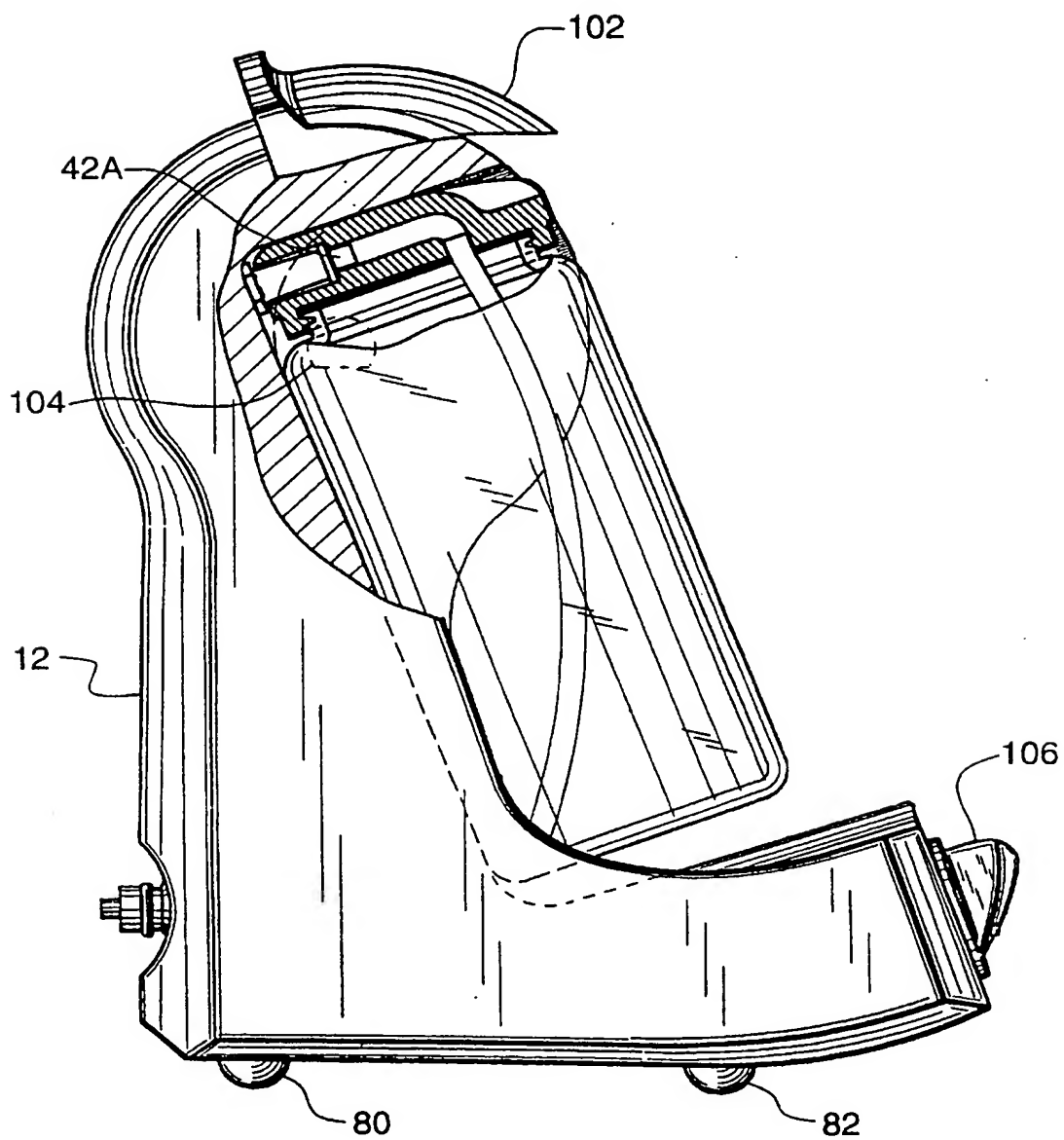


3 / 27
Fig. 1B



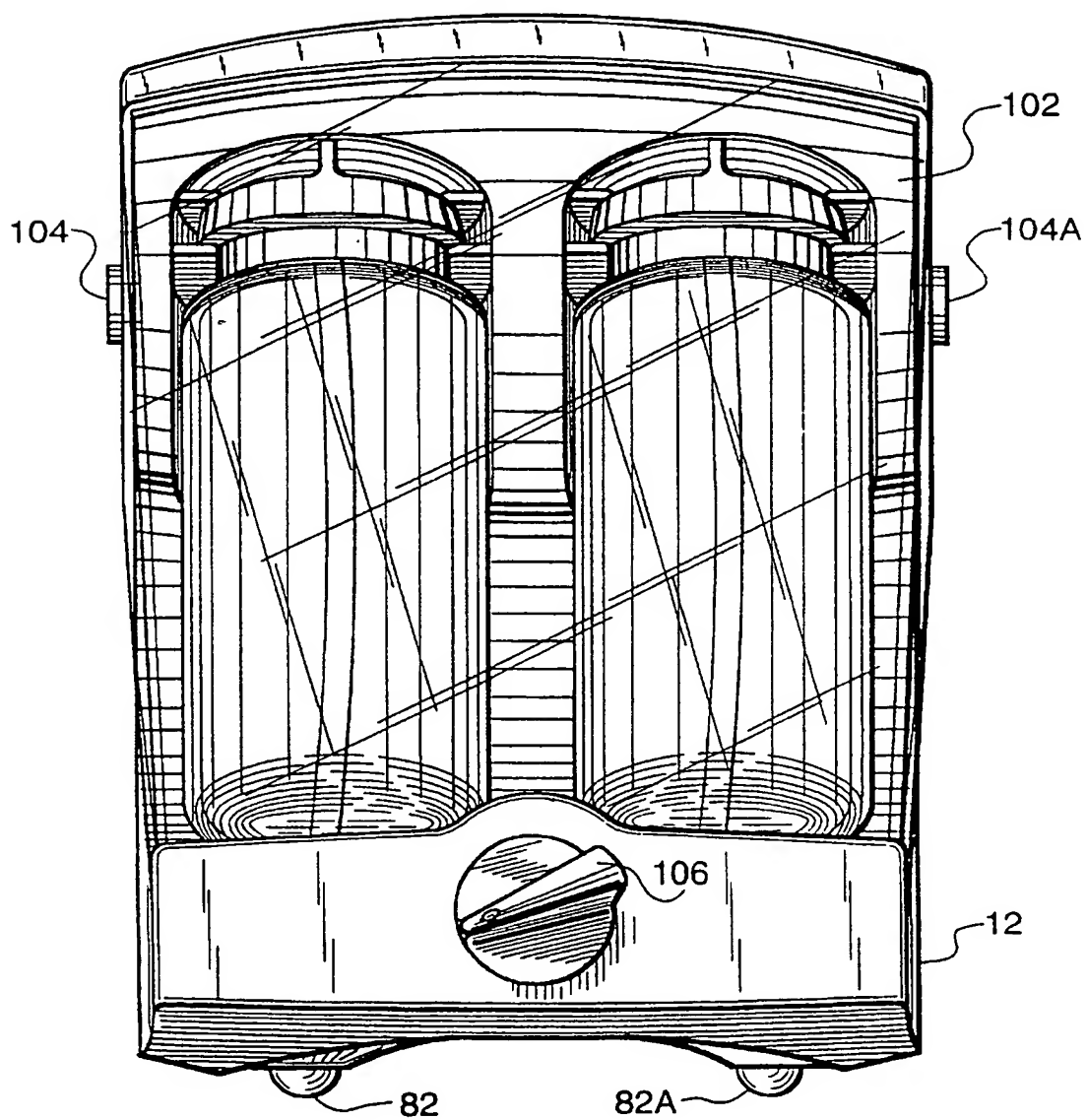
4 / 27

Fig. 1C



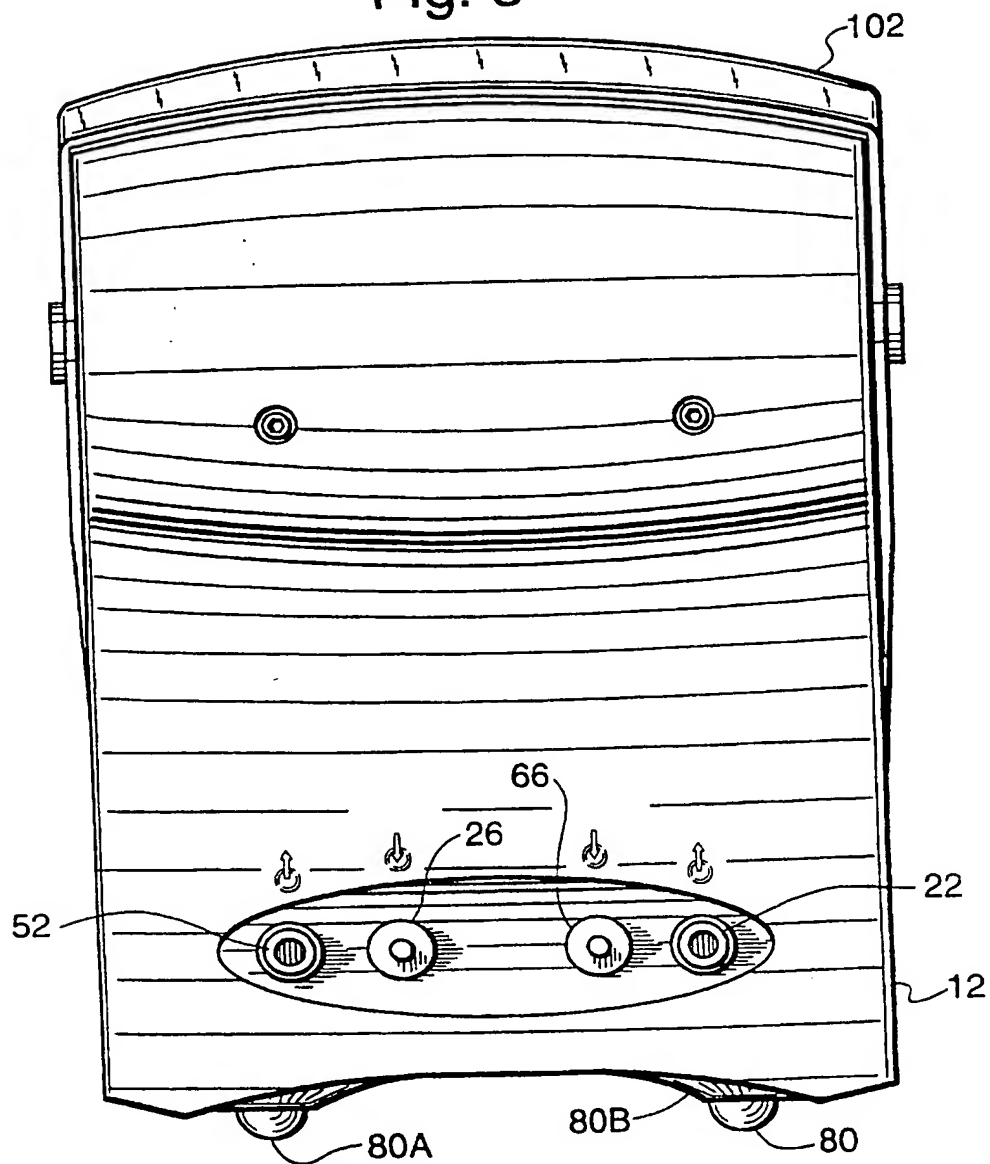
5 / 27

Fig. 2



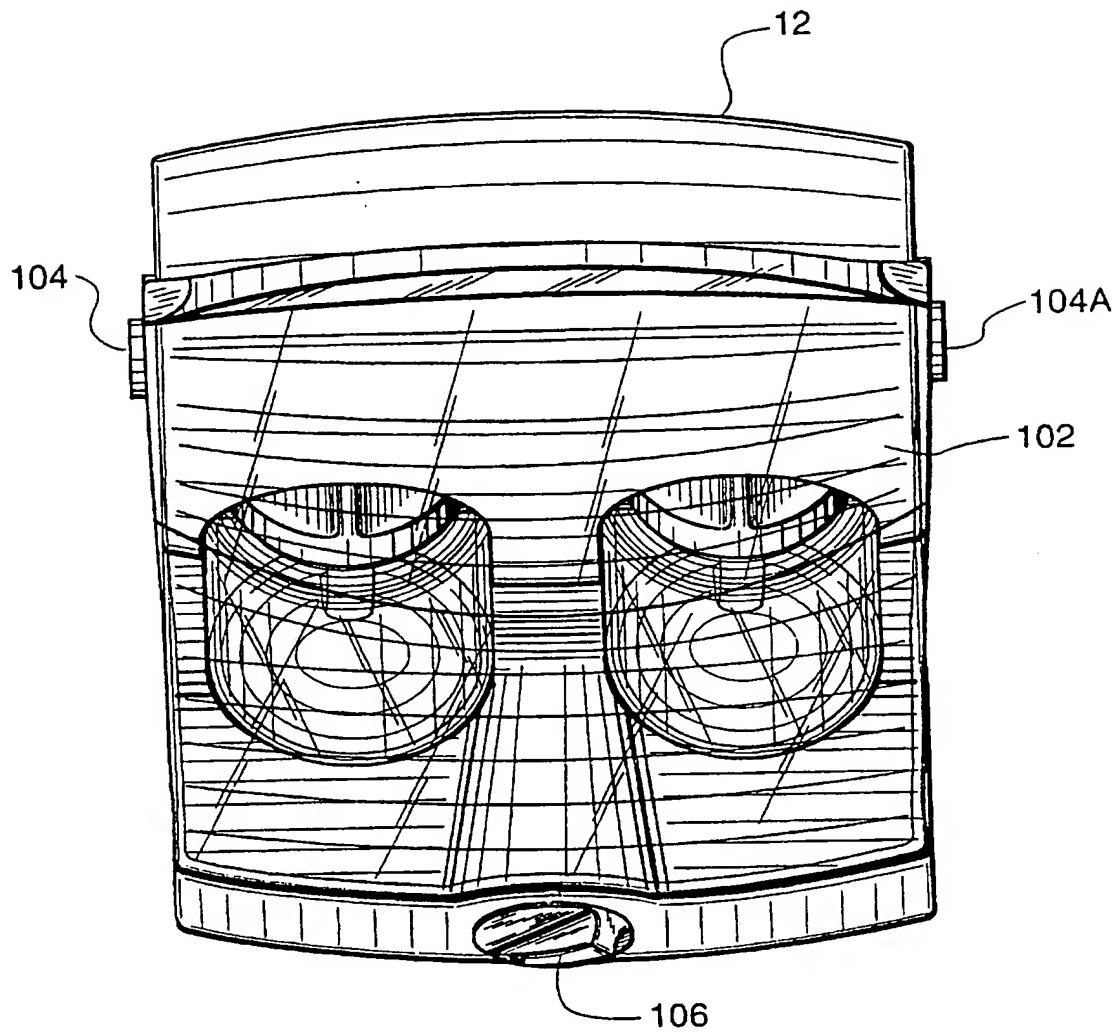
6 / 27

Fig. 3



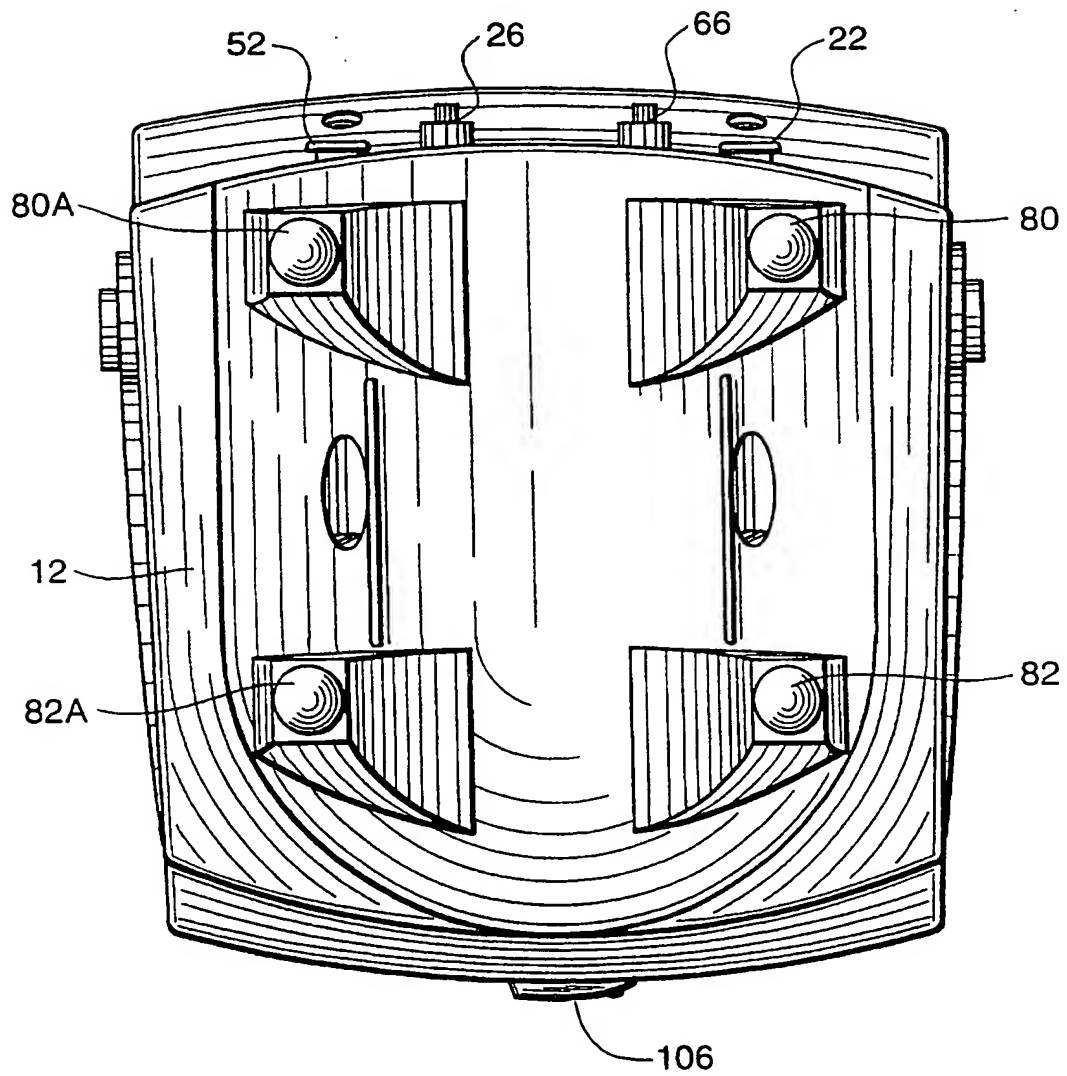
7 / 27

Fig. 4



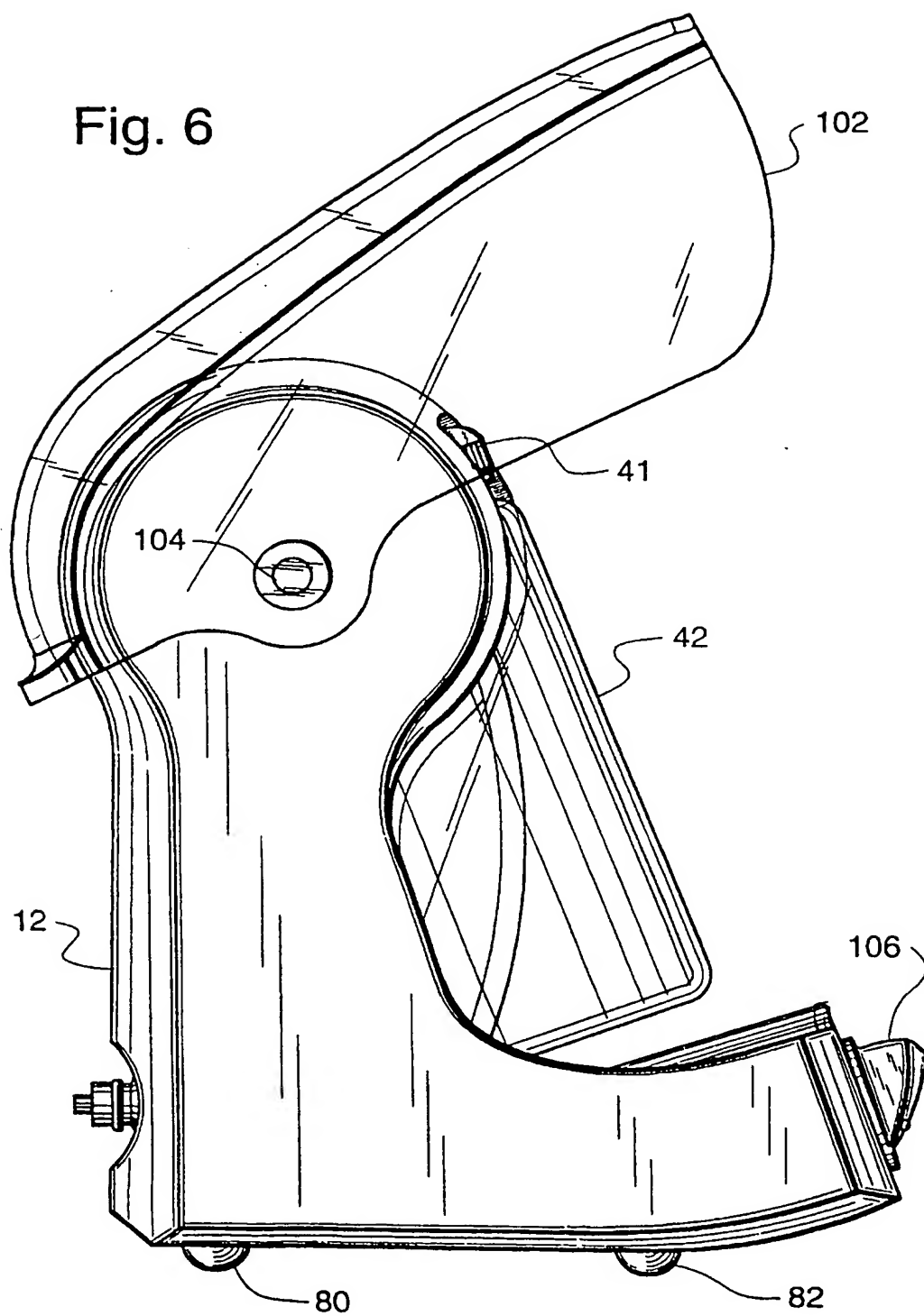
8 / 27

Fig. 5



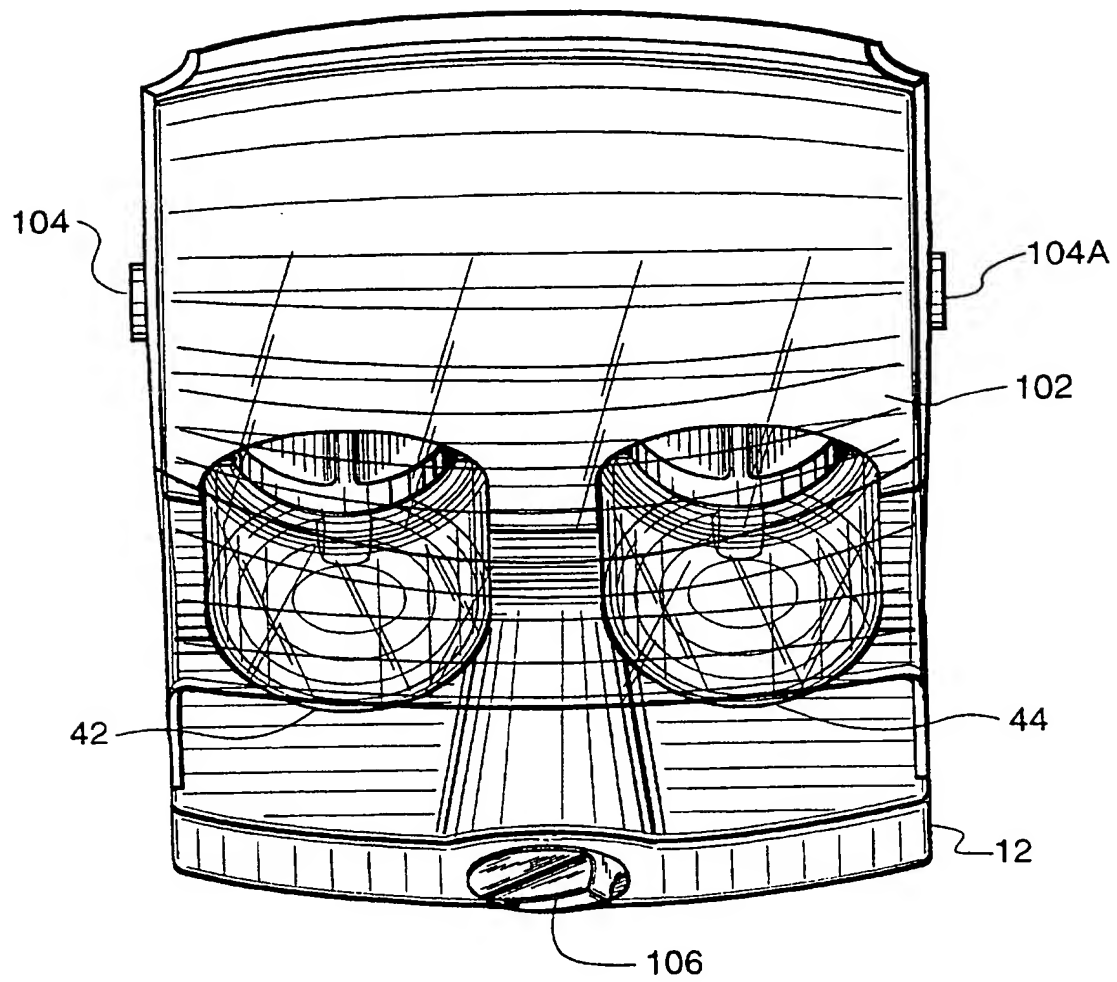
9 / 27

Fig. 6



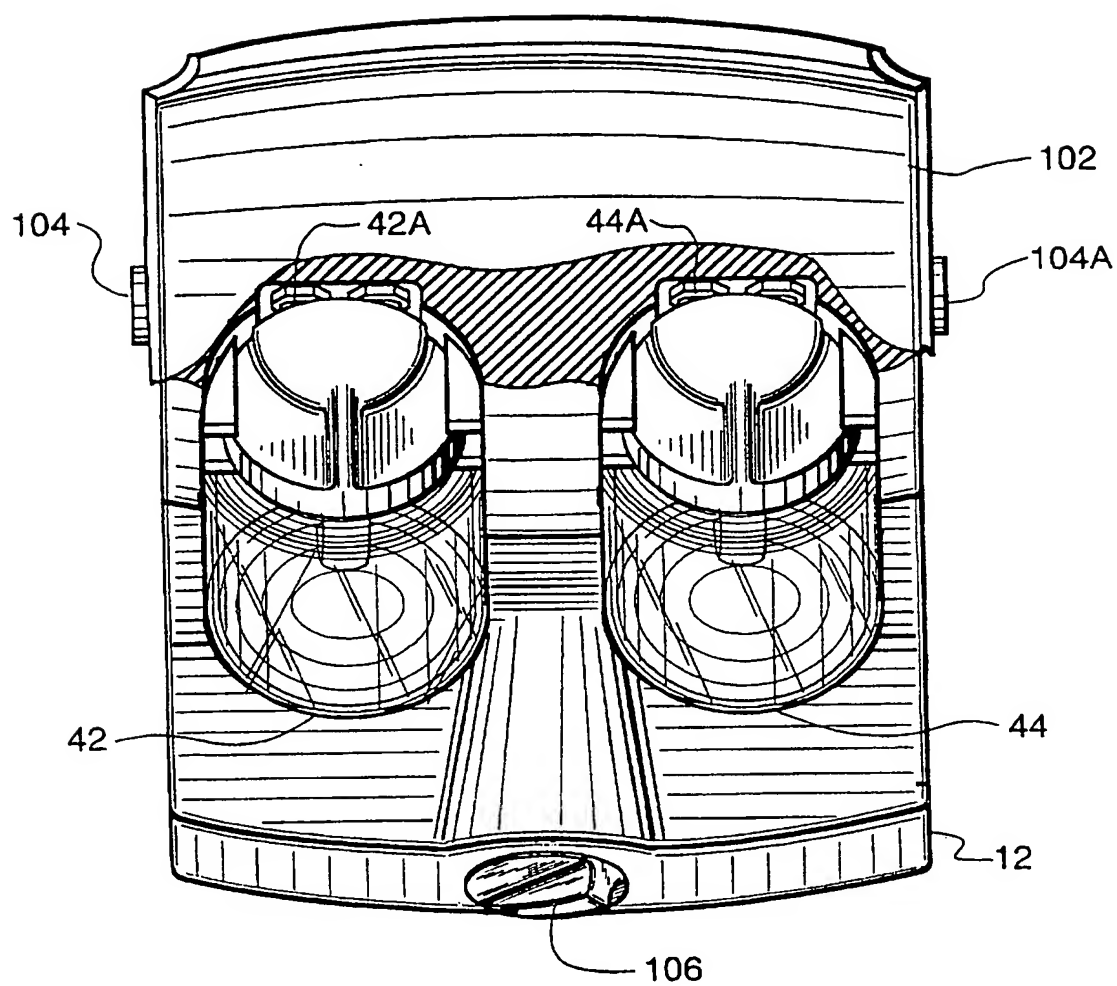
10 / 27

Fig. 7



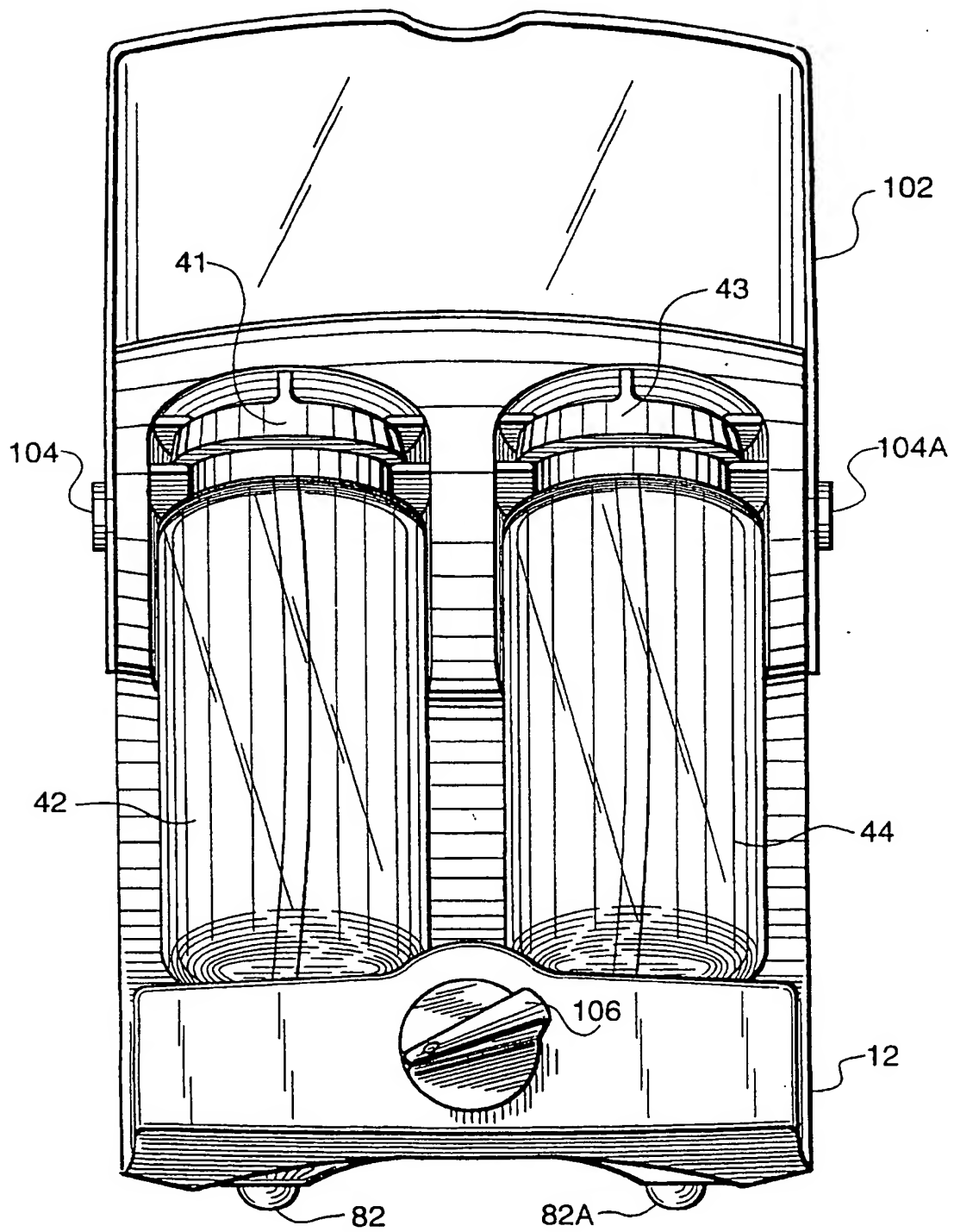
11 / 27

Fig. 7A



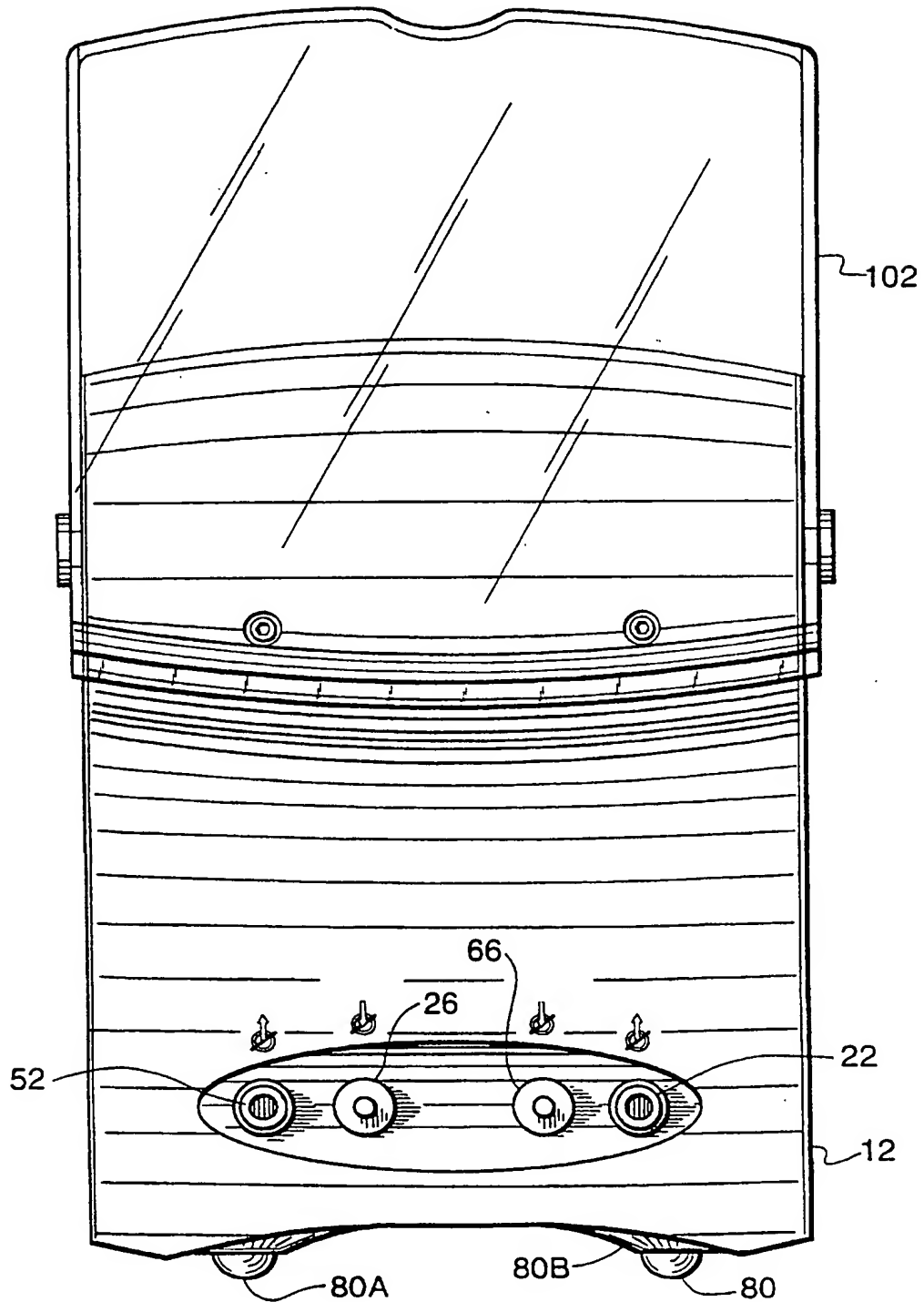
12 / 27

Fig. 8



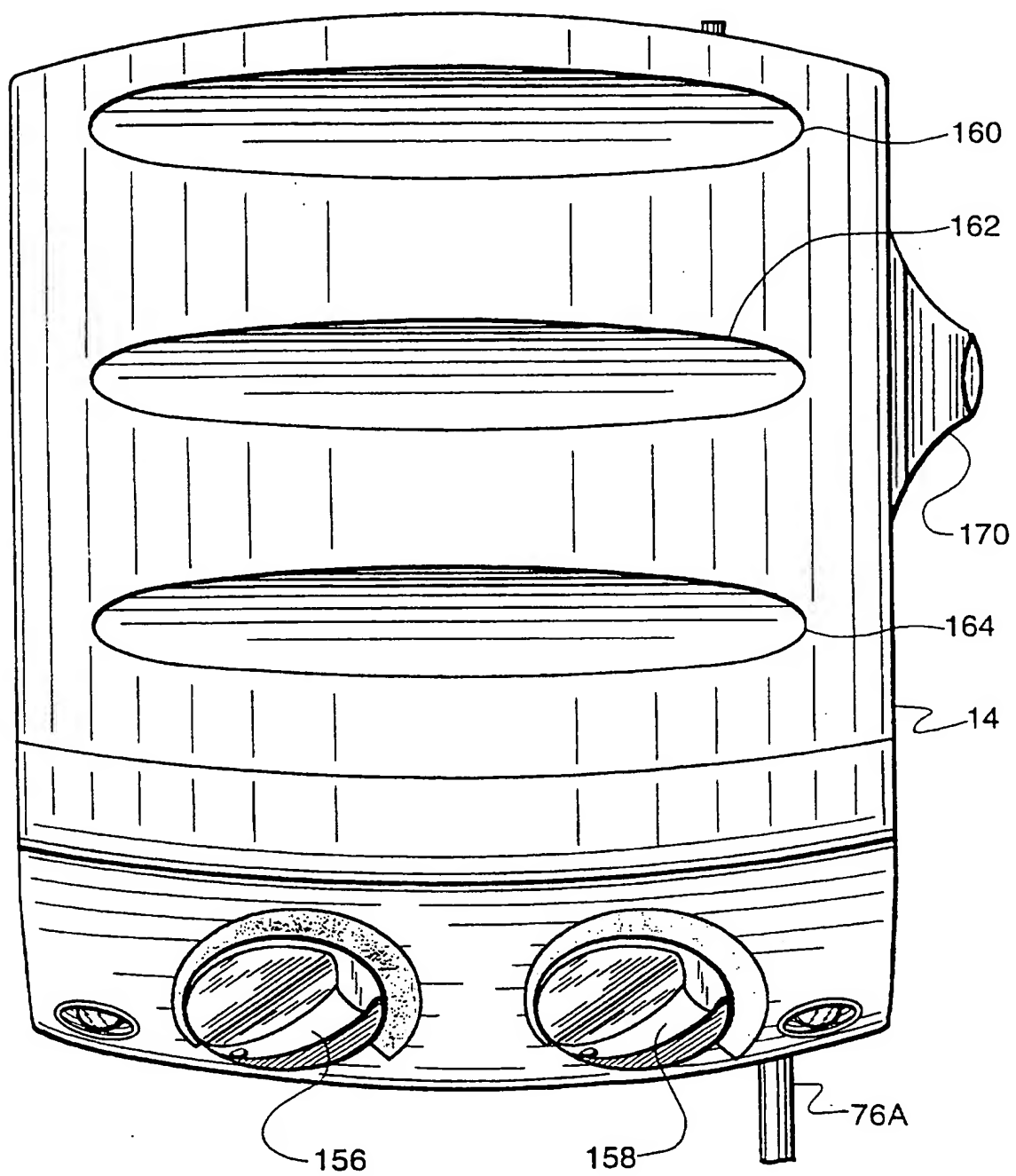
13 / 27

Fig. 9



14 / 27

Fig. 10



15 / 27

Fig. 11

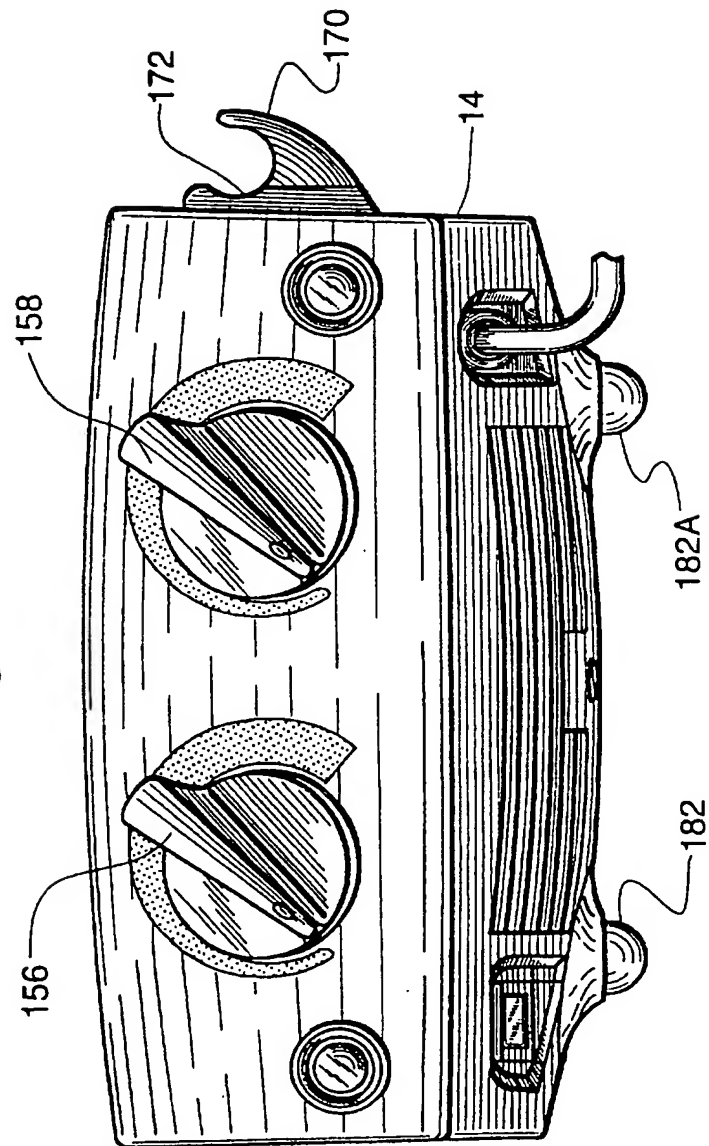
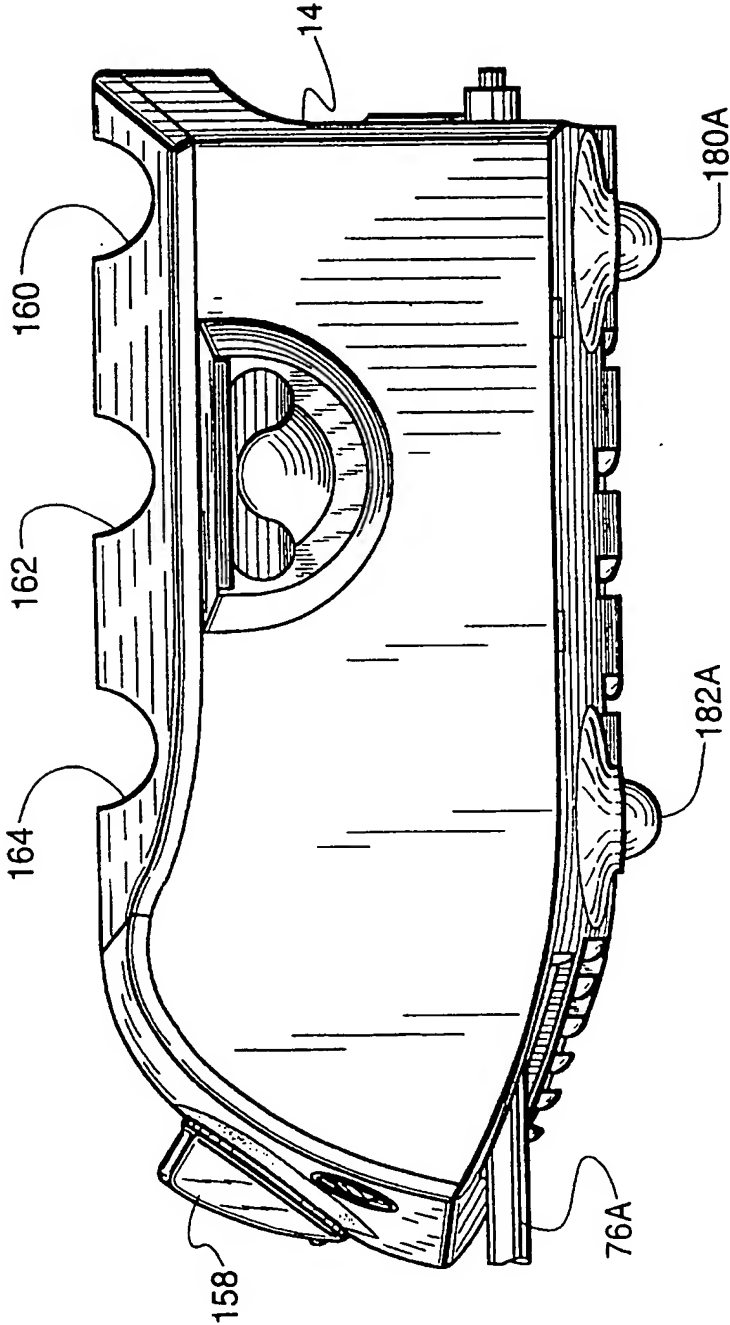
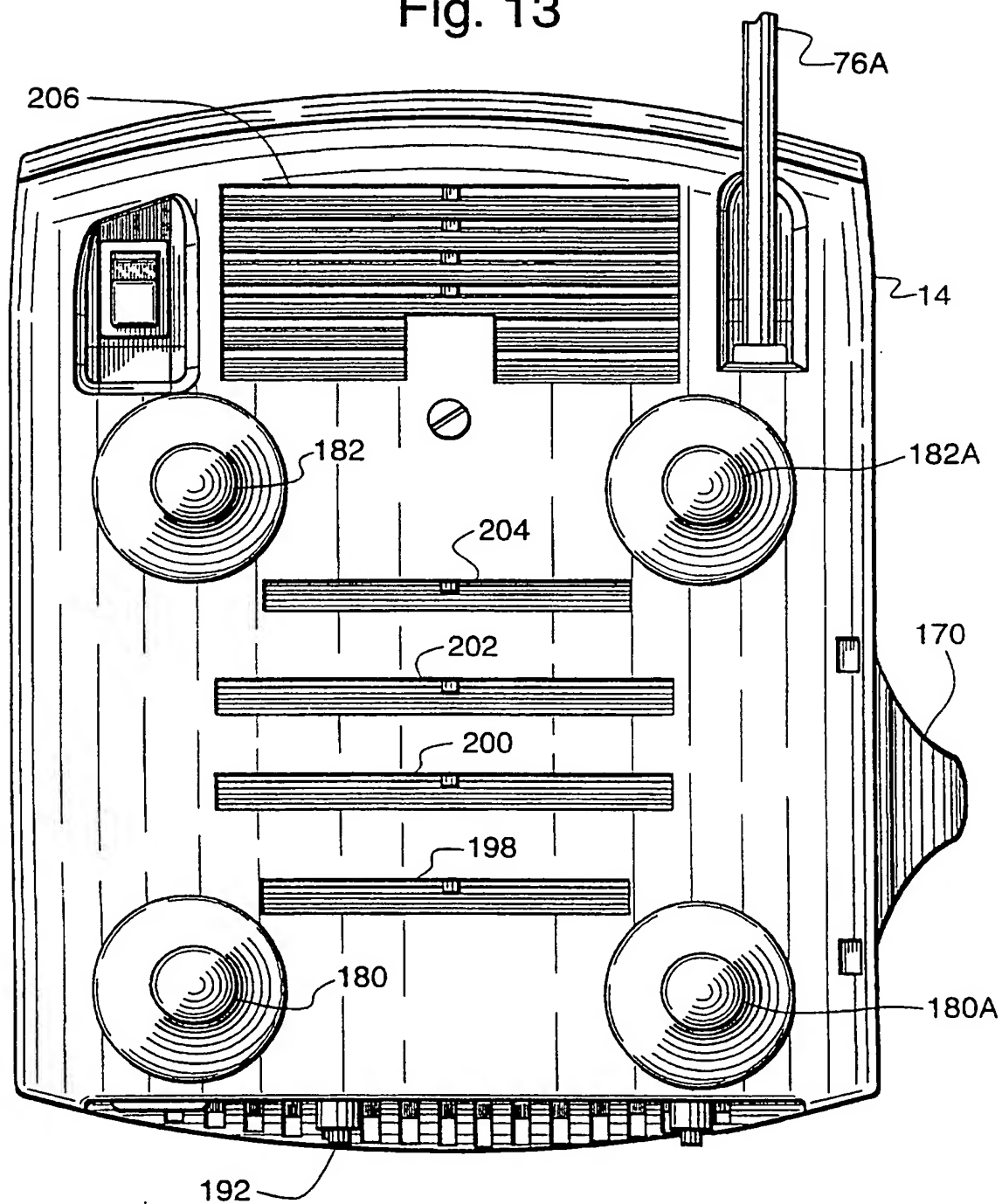


Fig. 12



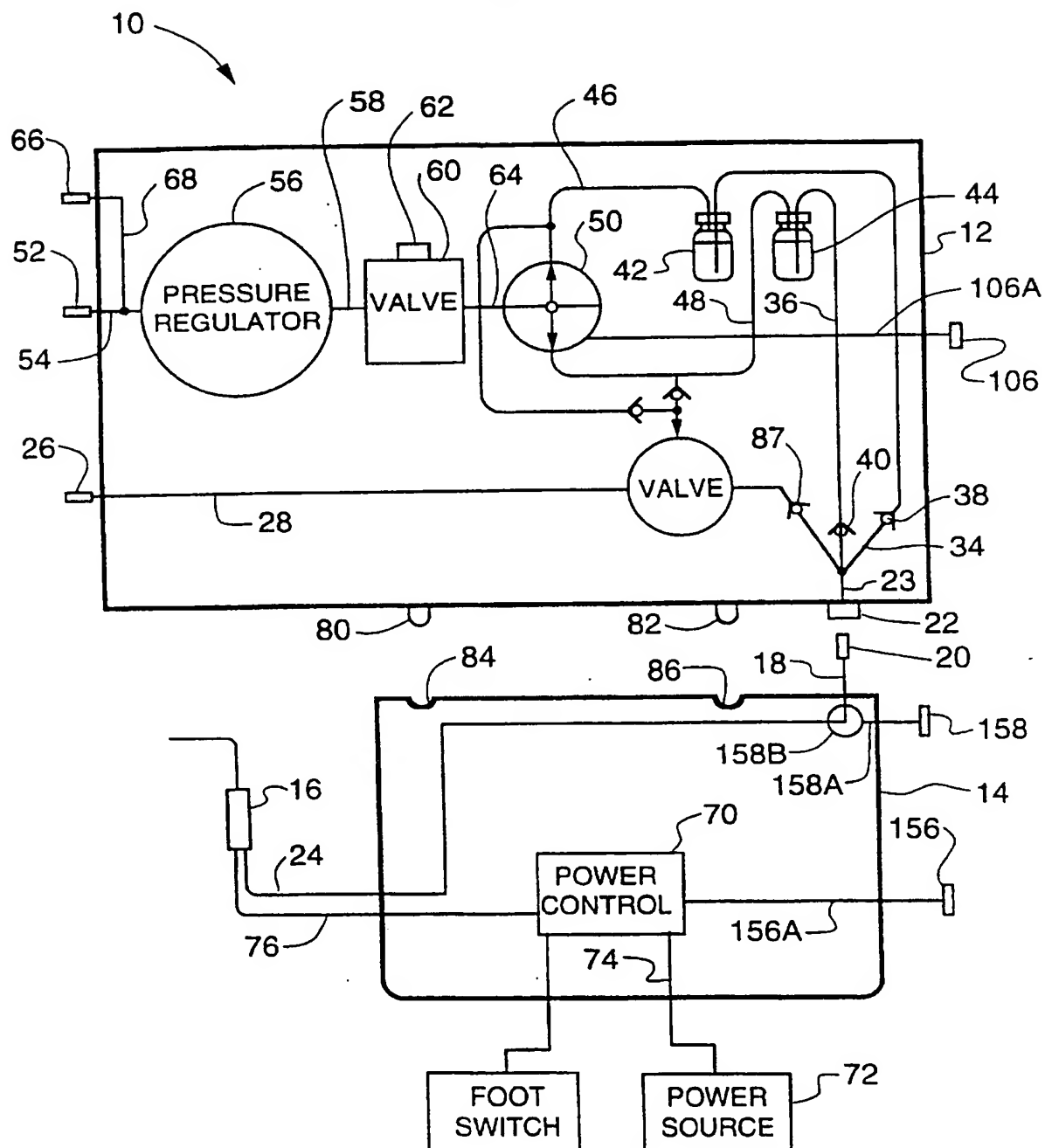
17 / 27

Fig. 13



18 / 27

Fig. 14



19 / 27

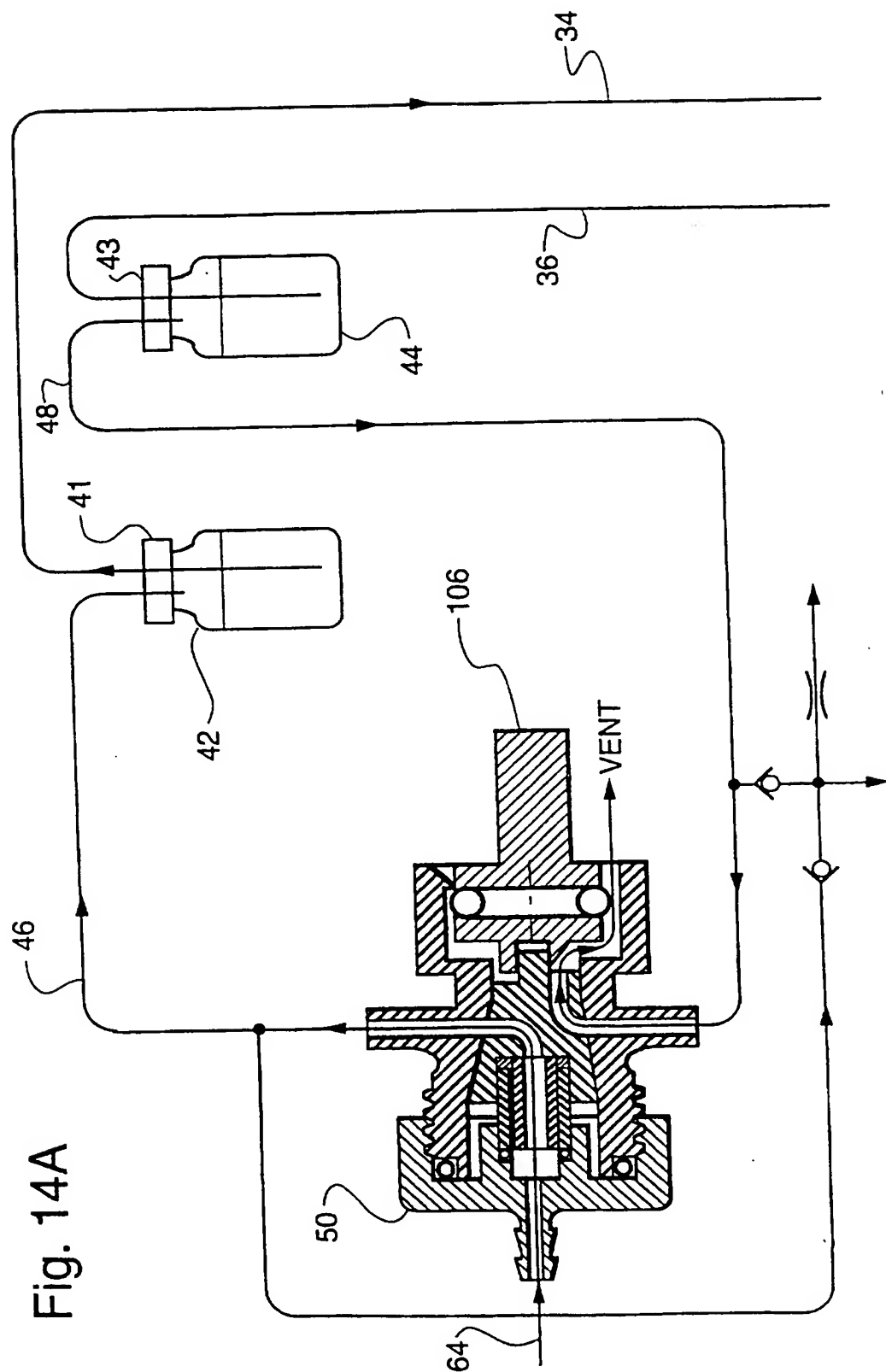
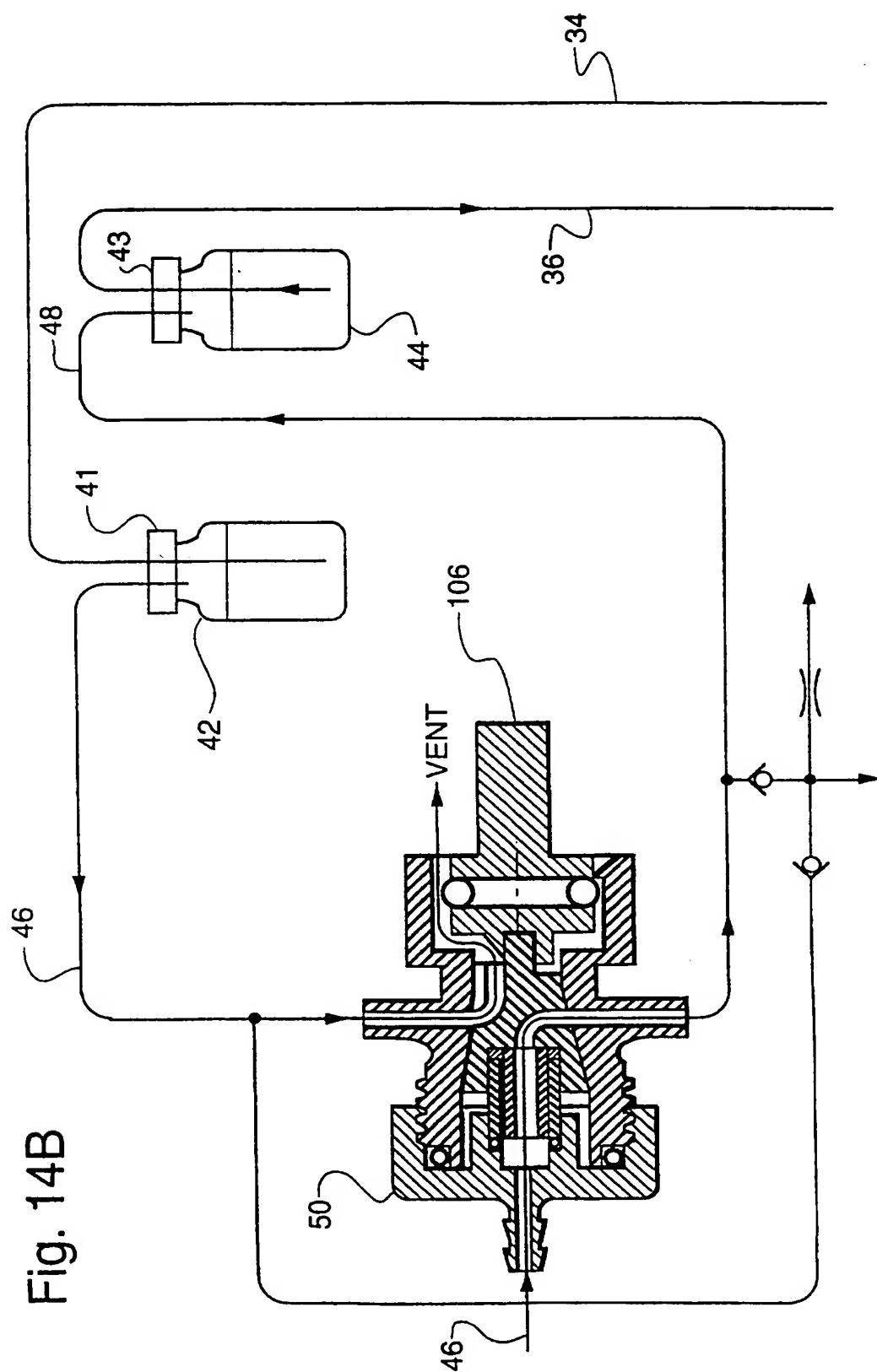


Fig. 14A

20 / 27



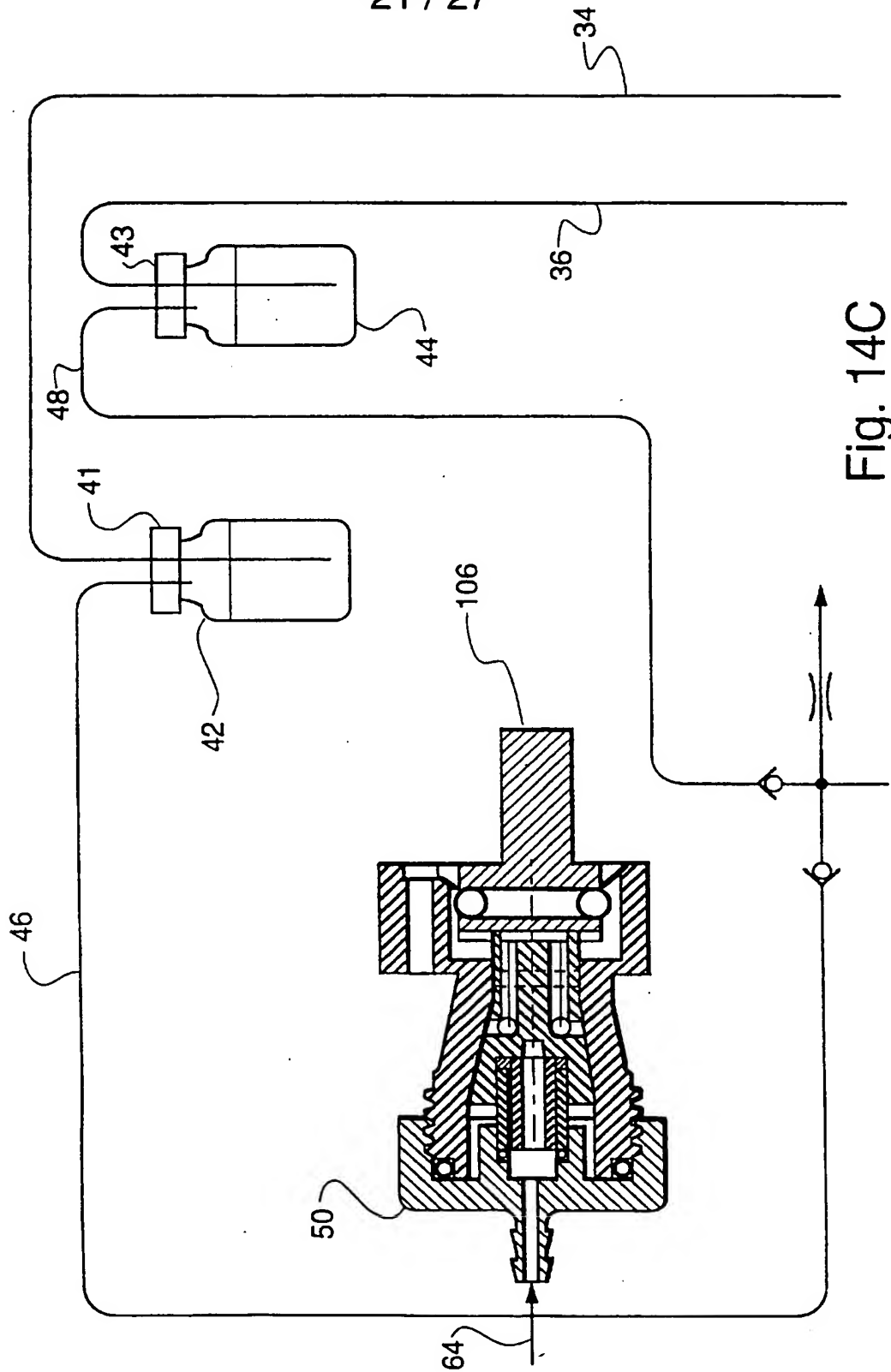
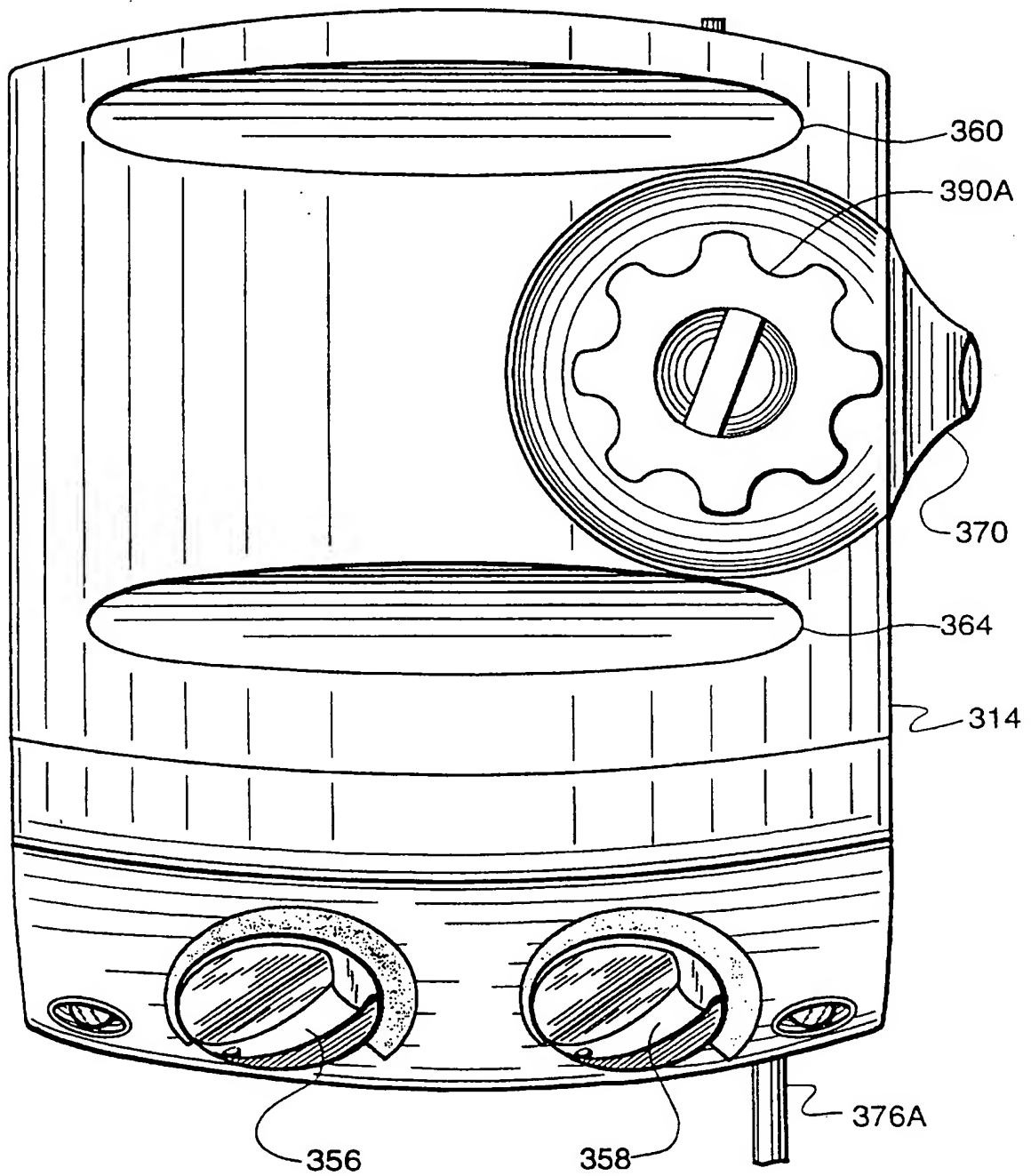


Fig. 14C

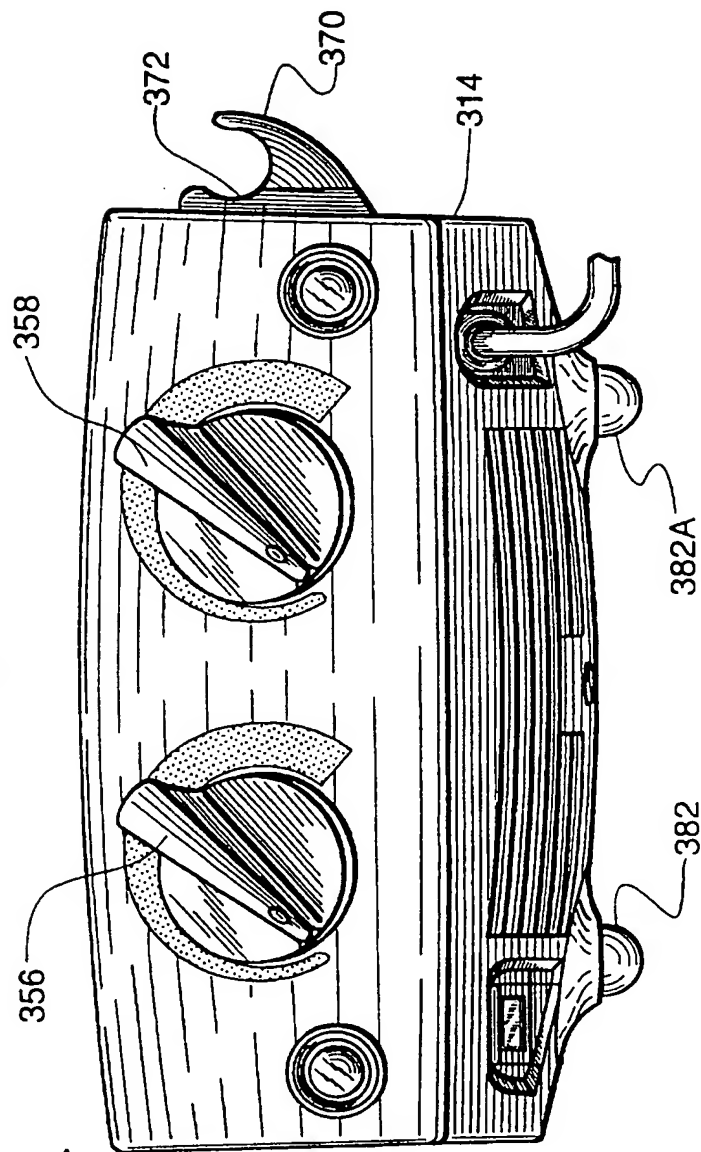
22 / 27

Fig. 15



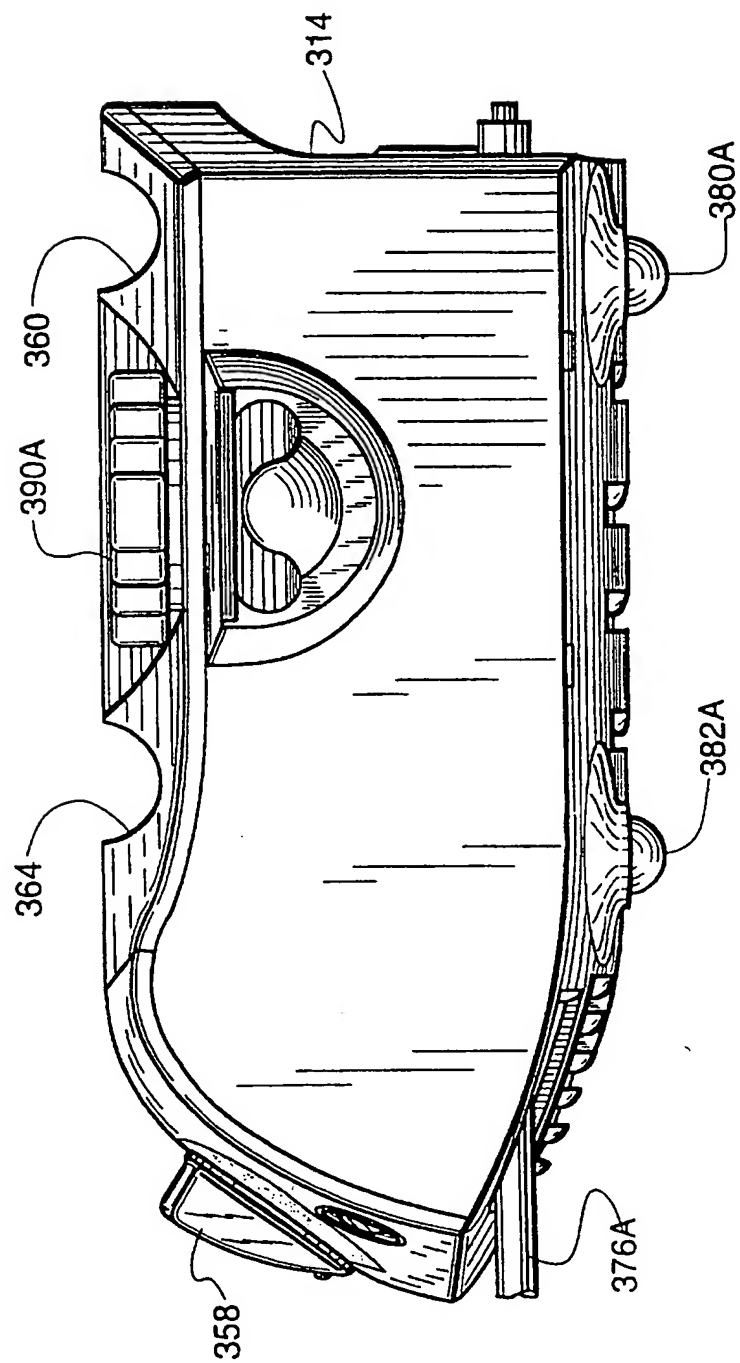
23 / 27

Fig. 16



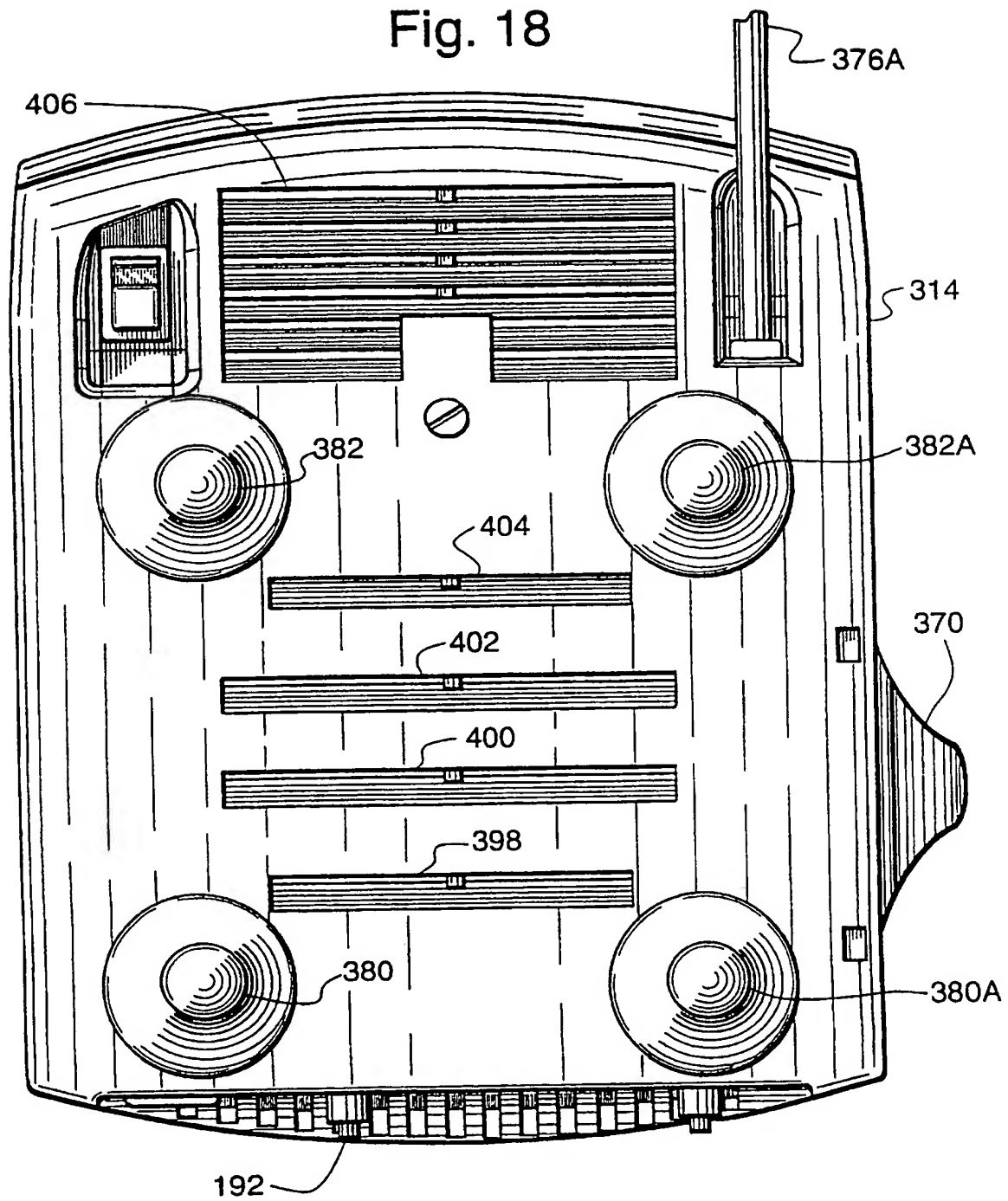
24 / 27

Fig. 17



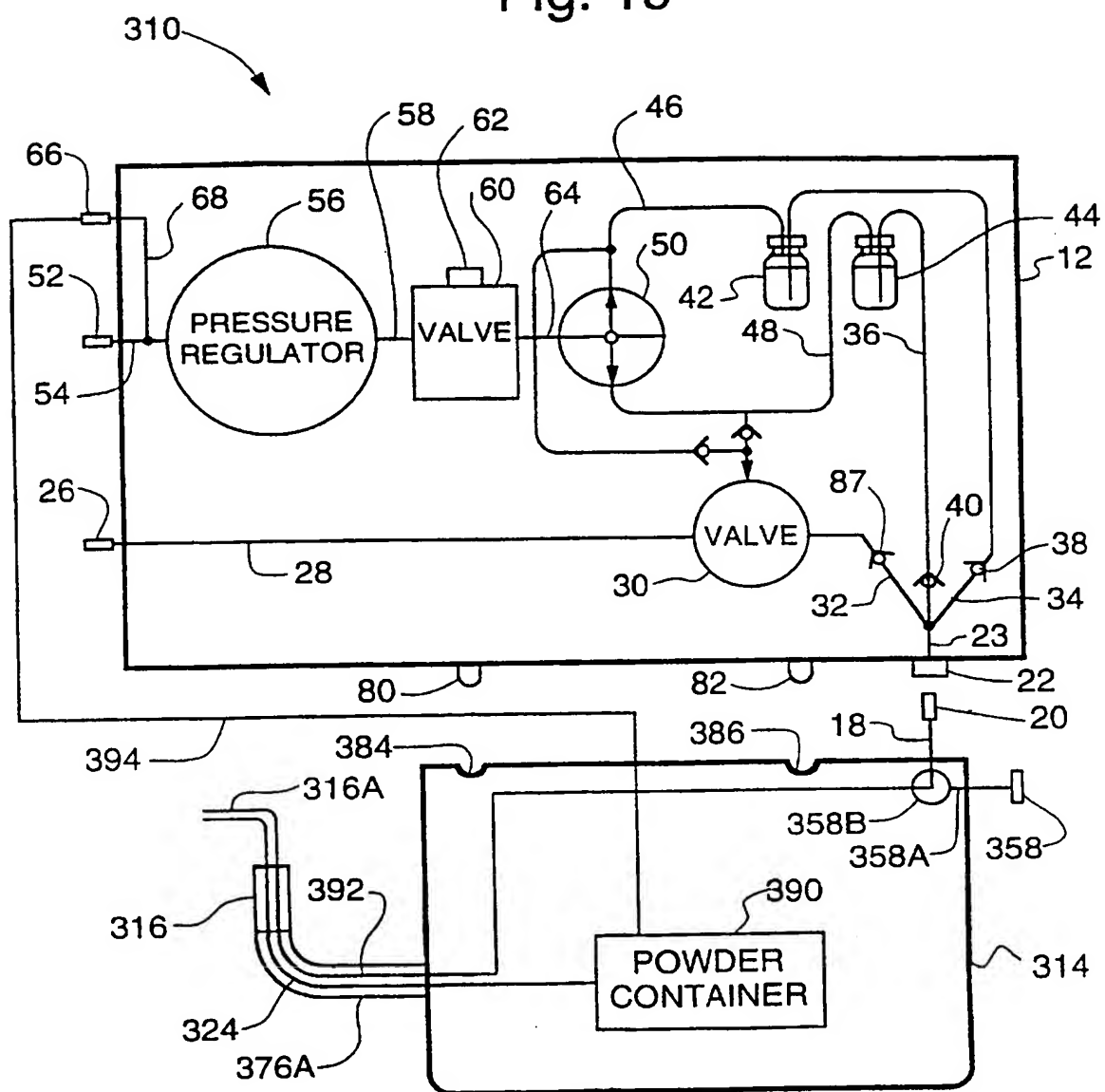
25 / 27

Fig. 18



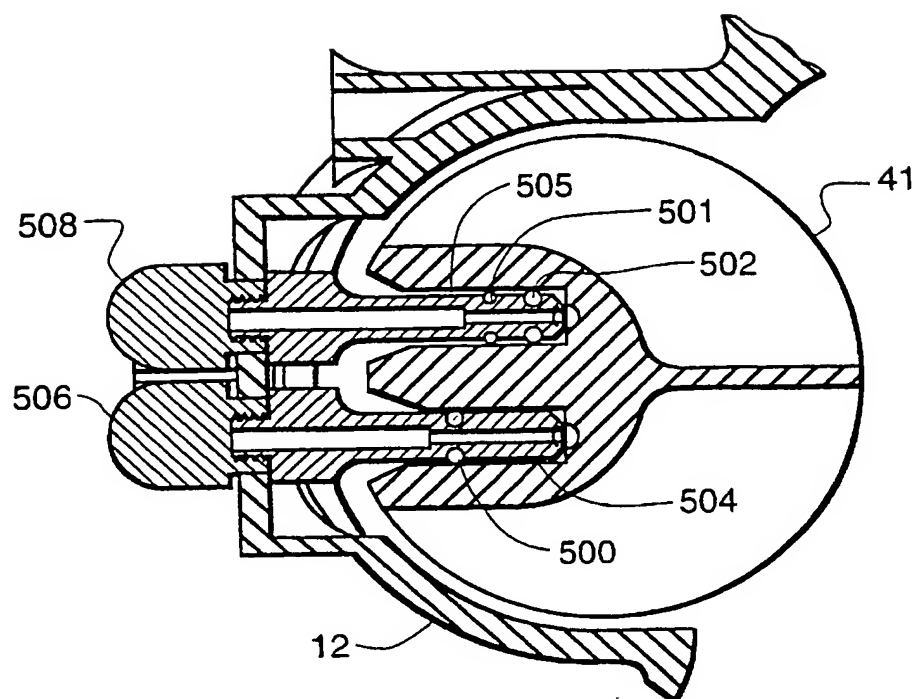
26 / 27

Fig. 19



27 / 27

Fig. 20



INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 97/17589

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A61C1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A61C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 193 197 A (KURIS ARTHUR ET AL) 18 March 1980 see column 1, line 66 - column 2, line 3 see column 2, line 40 - line 45 see column 2, line 64 - column 3, line 8 see column 3, line 42 - line 48 see column 5, line 18 - line 28 see column 10, line 4 - column 11, line 40 see figures 1,7,12	1-4, 8-11,13, 14,19-22
A	---	5-7,12, 15-18
	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

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- "P" document published prior to the international filing date but later than the priority date claimed

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Date of the actual completion of the international search

27 January 1998

Date of mailing of the international search report

03/02/1998

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INTERNATIONAL SEARCH REPORT

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PCT/US 97/17589

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 215 476 A (ARMSTRONG ALEXANDER S) 5 August 1980 see column 2, line 11 - line 20 see column 4, line 57 - column 5, line 8 see column 6, line 6 - line 31 see column 6, line 58 - column 7, line 42 see figures 1,6,7	5-7
X		
A	US 5 199 604 A (PALMER LEE ET AL) 6 April 1993 see column 3, line 49 - column 4, line 2	12,15-18 5-7,12, 15-18

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 97/17589

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 4215476 A	05-08-80	NONE	
US 5199604 A	06-04-93	US 5060825 A	29-10-91
		AU 7879391 A	27-11-91
		CA 2082063 A	05-11-91
		EP 0531366 A	17-03-93
		WO 9117112 A	14-11-91

Stacking reservoir and scaler system

Patent Number: ☐ US6030212
Publication date: 2000-02-29
Inventor(s): CORBELLINI ALFRED E (US); GUILMETTE V RICHARD (US); SEPTIMUS MARTIN I (US); SCHUMAN ROBERT J (US)
Applicant(s): DENTSPLY RES & DEV (US)
Requested Patent: ☐ WO9812980
Application Number: US19960723199 19960927
Priority Number (s): US19960723199 19960927
IPC Classification: A61G17/02
EC Classification: A61C1/00S6
Equivalents: DE69722804D, ☐ EP0935445 (WO9812980), B1, JP2001501113T, KR2000048704, TW418082

Abstract

A stacking system includes a reservoir housing, a base housing and a handpiece. The reservoir housing supports a readily removable container. The reservoir housing has feet and a pivotable cover, which in closed position encloses two containers which are connected by conduits to a valve. Each container has a cap with a first and a second cap connector. Each cap connector is connected to a housing connector. The handpiece is connected by conduits through the base housing to the containers. The cover is pivotable between an open position and a closed position. The cover, in closed position, prevents the cap from moving sufficiently for the cap connector to disengage from the housing connectors. The reservoir housing is supported by and positioned above the base housing. The base housing has an upper face. The upper face has grooves. The feet are positioned in the grooves.

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